Coptic Keyboard

Contents

Purpose

The Coptic language is valuable to a large population of 10 million people worldwide. And a Coptic keyboard for major platforms is long overdue.

Several non-standard keyboards have been designed independently, and the discrepancies between the layouts are causing confusion.

- A layout by Donald J. Mastronarde, from University of California.
- A layout by Christian Askeland from University of Cambridge.
- A layout by copticchurch.net.
- A layout by St. Shenouda the Archimandrite Coptic Society.

A Coptic keyboard is natively built in Android Gboard, but still hasn't been adopted in other major platforms.

Standardization

Availability

Character Set

Color code:
In all the tables below, the following cell colors are to be interpreted as follows:

- Green: characters that will be included in our layout.
- Red: characters that are decidedly not needed.
- Grey: characters that won't be included in our keyboard, but would have been considered if we had space.

Greek and Coptic Unicode Block (14 characters)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+037x	ͰͰ	ͱͱ	ͲͲ	ͳͳ	ʹʹ	͵͵	ͶͶ	ͷͷ			;;	ϳϳ	ΆΆ	··	ΈΈ	ΉΉ
U+038x					ΊΊ	ΌΌ	ΎΎ	ΏΏ	ΐΐ	ΑΑ	ΒΒ	ΓΓ	ΔΔ	ΕΕ	ΖΖ	ΗΗ
U+039x	ΘΘ	ΙΙ	ΚΚ	ΛΛ	ΜΜ	ΝΝ	ΞΞ	ΟΟ	ΠΠ	ΡΡ		ΣΣ	ΤΤ	ΥΥ	ΦΦ	ΧΧ
U+03Ax	ΨΨ	ΩΩ	ΪΪ	ΫΫ	άά	έέ	ήή	ίί	ΰΰ	αα	ββ	γγ	δδ	εε	ζζ	ηη
U+03Bx	θθ	ιι	κκ	λλ	μμ	νν	ξξ	οο	ππ	ρρ	ςς	σσ	ττ	υυ	φφ	χχ
U+03Cx	ψψ	ωω	ϊϊ	ϋϋ	όό	ύύ	ώώ	ϏϏ	ϐϐ	ϑϑ	ϒϒ	ϓϓ	ϔϔ	ϕϕ	ϖϖ	ϗϗ
U+03Dx	ϘϘ	ϙϙ	ϚϚ	ϛϛ	ϜϜ	ϝϝ	ϞϞ	ϟϟ	ϠϠ	ϡϡ	ϢϢ	ϣϣ	ϤϤ	ϥϥ	ϦϦ	ϧϧ
U+03Ex	ϨϨ	ϩϩ	ϪϪ	ϫϫ	ϬϬ	ϭϭ	ϮϮ	ϯϯ	ϰϰ	ϱϱ	ϲϲ	ϳϳ	ϴϴ	ϵϵ	϶϶	ϷϷ
U+03Fx	ϸϸ	ϹϹ	ϺϺ	ϻϻ	ϼϼ	ϽϽ	ϾϾ	ϿϿ	ЀЀ	ЁЁ	ЂЂ	ЃЃ	ЄЄ	ЅЅ	ІІ	ЇЇ

Coptic Unicode Block (123 characters)

The entirety of the Coptic unicode block should be included.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+2C8x	Ⲁ	ⲁ	Ⲃ	ⲃ	Ⲅ	ⲅ	Ⲇ	ⲇ	Ⲉ	ⲉ	Ⲋ	ⲋ	Ⲍ	ⲍ	Ⲏ	ⲏ
U+2C9x	Ⲑ	ⲑ	Ⲓ	ⲓ	Ⲕ	ⲕ	Ⲗ	ⲗ	Ⲙ	ⲙ	Ⲛ	ⲛ	Ⲝ	ⲝ	Ⲟ	ⲟ
U+2CAx	Ⲡ	ⲡ	Ⲣ	ⲣ	Ⲥ	ⲥ	Ⲧ	ⲧ	Ⲩ	ⲩ	Ⲫ	ⲫ	Ⲭ	ⲭ	Ⲯ	ⲯ
U+2CBx	Ⲱ	ⲱ	□	□	□	□	□	□	□	□	□	□	□	□	□	□
U+2CCx	Ⳳ	ⳳ	□	□	□	□	□	□	□	□	□	□	□	□	□	□
U+2CDx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
U+2CEx	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
U+2CFx	□	□	□	□						□	□	□	□	⳹	⳺	⳻

Epact Numbers (1 character out of 28)

From the Epact Numbers, at least the Thousand Mark should be included.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+102Ex	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

U+102Fx	𐋯	𐋰	𐋱	𐋲	𐋳	𐋴	𐋵	𐋶	𐋷	𐋸	𐋹	𐋺				

Layman Characters (27 + 12 = 39 / 42)

The *Layman Characters* are non-alphabetical characters on the Latin keyboard, which generally belong to the following categories:

- Punctuation Marks
- Digits and Mathematical symbols

Main Keys	Number row (Normal)	Number row (Shift)
;	`	~
:	1	!
‘	2	@
“	3	#
,	4	$
.	5	%
/	6	^
?	7	&
[	8	*
]	9	(
{	0	)
}	-	_
<	=	+
>	\	|

Researcher Characters

Currently, we have space for 47 * 4 - [14 (demotic) + 50 (greek) + 61(block remainder except Nubian) + 12 (Latin keyboard) + 1 (epact thousand mark) + 27 (Latin keyboard)] = 23 characters.
These include:

- Non-combining diacritics that are using by researchers on digitizing Coptic

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The closest to the standard is Unicode's documentation (or at least that's what Noto is using). Coptic is not defined in the Unicode in a single chapter and IMHO definition might be incomplete.

- Coptic characters and diacritics need to be searched for at https://www.unicode.org/Public/13.0.0/charts/CodeCharts.pdf .
- Description (IMHO might be incomplete) is at https://www.unicode.org/versions/Unicode13.0.0/UnicodeStandard-13.0.pdf (see page 308 chapter 7.3 Coptic; also page 835)

However, implementers of Coptic ought to also research other documentation. For example here are the submissions to the Unicode ad-hoc group (the team that reviews the scripts and passes them onto UTC for approvals). These submissions might have more info than the Unicode's official doc:

- https://www.unicode.org/L2/L2010/10421r-coptic-numbers-name-change.pdf
- https://www.unicode.org/L2/L2010/10348-n3912-coptic-adds.pdf
- https://www.unicode.org/L2/L2011/11062r-coptic-epact.pdf
- https://www.unicode.org/L2/L2004/04130-n2744-coptic.pdf

Support Abbreviations

- **CA**: Christian Askeland
- **CUI**: Coptic Unicode Input
- **..D**: ???
- **MR**: Mina Makar
- **ML**: Mina Mikhail
- **GG**: Google Gboard
- **MJ**: Marek Z Jeziorek
- **WS**: Wikipedia Snapshot
- **WJ**: Wazu Japan
- **NA**: New Athena Unicode Coptic Font
- **AN**: Antinoou Font

Combining Characters

This list contains diacritics that are used in various Coptic dialects.

Character (selected ones are highlighted in green)		CA	CUI	..D	MR	ML	GG	MJ	WS	WJ	NA	AN
'COMBINING GRAVE ACCENT' (U+0300)	◌̀		✅	✅	✅	✅	✅	✅			✅	✅

'COMBINING ACUTE ACCENT' (U+0301)	◌́		✅	✅	✅	✅	✅	✅			✅	✅
'COMBINING CIRCUMFLEX ACCENT' (U+0302)	◌̂	✅	✅	✅		✅	✅	✅			✅	✅
'COMBINING MACRON' (U+0304)	◌̄	✅			✅		✅	✅			✅	✅
'COMBINING OVERLINE' (U+0305)	◌̅	✅	✅	✅	✅	✅	✅	✅			✅	✅
'COMBINING DOT ABOVE' (U+0307)	◌̇		✅	✅	✅	✅	✅	✅			✅	✅
'COMBINING DIAERESIS' (U+0308)	◌̈	✅	✅	✅	✅	✅	✅	✅			✅	✅
'COMBINING DOUBLE ACUTE ACCENT' (U+030B)	◌̋		✅								✅	
'COMBINING CARON' (U+030C)	◌̌		✅								✅	✅
'COMBINING INVERTED BREVE' (U+0311)	◌̑			✅		✅	✅	✅			✅	
'COMBINING DOT BELOW' (U+0323)	◌̣	✅	✅	✅	✅	✅	✅	✅			✅	✅
'COMBINING VERTICAL LINE BELOW' (U+0329)	◌̩		✅								✅	
'COMBINING DOUBLE OVERLINE' (U+033F)	◌̿				✅		✅	✅			✅	✅
'COMBINING DOT ABOVE RIGHT' (U+0358)	◌͘											
'COMBINING DOUBLE MACRON' (U+035E)	◌͞◌		✅	✅		✅		✅			✅	
'COMBINING DOUBLE INVERTED BREVE' (U+0361)	◌͡◌			✅			✅	✅			✅	
'COMBINING DOUBLE CIRCUMFLEX ABOVE' (U+1DCD)	◌᷍ ◌	✅										✅
'COMBINING DOT ABOVE LEFT' (U+1DF8)	◌᷸											
'COMBINING MACRON LEFT HALF' (U+FE24)	◌️	✅			✅		✅	✔️				✅
'COMBINING MACRON RIGHT HALF' (U+FE25)	◌️	✅			✅		✅	✔️				✅
'COMBINING CONJOINING MACRON' (U+FE26)	◌️				✅		✅	✔️				✅

Non-combining Characters

This list contains punctuation marks that are used in various Coptic dialects. It also includes characters that are used by researchers for digitizing Coptic manuscripts.

Character (selected ones are highlighted in green)		CA	CUI	..D	MR	ML	GG	MJ
'SECTION SIGN' (U+00A7)	§	✅	✅					
'PLUS-MINUS SIGN' (U+00B1)	±	✅	✅					
'MIDDLE DOT' (U+00B7)	·	✅	✅	✅		✅	✅	
'MULTIPLICATION SIGN' (U+00D7)	×		✅					
'GREEK SMALL LETTER ARCHAIC KOPPA' (U+03D9)	ϙ		✅					
'FIGURE DASH' (U+2012)	‒		✅					
'EN DASH' (U+2013)	–		✅	✅	✅			
'EM DASH' (U+2014)	—		✅	✅			✅	
'DOUBLE VERTICAL LINE' (U+2016)	‖		✅					
'LEFT DOUBLE QUOTATION MARK' (U+201C)	“		✅					
'RIGHT DOUBLE QUOTATION MARK' (U+201D)	”		✅					
'DAGGER' (U+2020)	†						✅	
'HORIZONTAL ELLIPSIS' (U+2026)	…		✅					
'PER MILLE SIGN' (U+2030)	‰		✅					
'THREE DOT PUNCTUATION' (U+2056)	⁖						✅	
'FOUR DOT PUNCTUATION' (U+2058)	⁘	✅					✅	
'FIVE DOT PUNCTUATION' (U+2059)	⁙						✅	
'DOTTED CROSS' (U+205C)	⁜	✅						
'TRICOLON' (U+205D)	⁝	✅						
'METRICAL BREVE' (U+23D1)	⏑		✅					
'MATHEMATICAL LEFT WHITE SQUARE BRACKET' (U+27E6)	⟦		✅					
'MATHEMATICAL RIGHT WHITE SQUARE BRACKET' (U+27E7)	⟧		✅					
'DOUBLE OBLIQUE HYPHEN' (U+2E17)	⸗	✅	✅	✅	✅	✅	✅	

'RAISED DOT' (U+2E33)	⸳						✅	
'RAISED COMMA' (U+2E34)	⸴						✅	

Character Set Reasoning

Punctuation marks and digits are extremely important. Those weren’t compromised. It was also preferred to include all the mathematical symbols.

Romanization

See Library of Congress.

Coptic Letter	Romanization	Placement
ⲁ	A	A
ⲃ	B	B
ⲅ	G	G
ⲇ	D	D
ⲉ	E	E
ⲍ	Z	Z
ⲏ	Ē	Y
ⲑ	TH	,
ⲓ	I	I
ⲕ	K	K
ⲗ	L	L
ⲙ	M	M
ⲛ	N	N
ⲝ	X	[
ⲟ	O	O
ⲡ	P	P
ⲣ	R	R
ⲥ	S	S
ⲧ	T	T
ⲩ	U	U
ⲫ	PH	V
ⲭ	CH	Q
ⲯ	PS	]
ⲱ	Ō	W
ⳁ	Š	/

ҷ	F	F
ҕ	Ӈ	X
ƨ	H	H
ӿ	Č	J
ɓ	Ky	C
ŧ	TI	.

Layout Placement Criteria

Intuitiveness for Laymen

Prioritization

Category	**Count**	**Source**	**List**	**Purpose**
Bohairic & Sahidic Alphabet	32 x 2	Coptic and Greek Unicode	ⲀⲂⲄⲆⲈⲊⲌⲎⲐⲒⲔⲖⲘⲚⲜⲞⲠⲢ ⲤⲦⲨⲪⲬⲮⲰϢϤϦϨϪϬϮ	Coptic Alphabet
Bohairic diacritics	2	Other	ⲁ̀ⲁ̅	Bohairic Diacritics
Punctuation Marks #1	2	Latin Keyboard	,.	Modernization
Punctuation Marks #2	15	Latin Keyboard	;:'"/?-=!%*()_+	Modernization
Modern Digits	10	Latin Keyboard	0123456789	Modernization
Punctuation Marks #3	12	Latin Keyboard	[]{}<>~#$^&|	Modernization
Coptic Abbreviations	7	Coptic Unicode	□⳥⳦⳧⳨⳩⳪	Legacy Monograms
Coptic Non-Epact Digits	1 x 2	Coptic Unicode	⳨	Legacy Numerals
Epact Thousand Mark	1	Epact Unicode	ⲁ□	Legacy Numerals
Double Overline	1	Other	ⲁ̿	Legacy Numerals
Fraction One Half	1	Coptic Unicode	⳽	Legacy Numerals
Akhmimic Letters	1 x 2	Coptic Unicode	□	Akhmimic
Old Bohairic Letters	1 x 2	Coptic Unicode	□	Bohairic
Modern Coptic Diacritics	13	Other	ⲁ́ⲁ̂ⲁ̄ⲁ̇ⲁ̈ⲁ̑ⲁ̣ⲁ̿ⲁⷮⲁ͡ⲁⲁ□ⲁ□ⲁ□	Major dialects
Modern Coptic Researcher symbols	8	Other	§±·——†·⁚·⸗	Research

Ancient Coptic Punctuation Marks	2	Coptic Unicode	⳹⳺	Research
Ancient Coptic Diacritics	3	Coptic Unicode	⳯⳰⳱	Research
Old Coptic Letters	11 x 2	Coptic Unicode	ⳬⳭⳮⳲⳳ⳴⳵⳶⳷⳸⳹	Research
Dialect-P Letters	4 x 2	Coptic Unicode	⳺⳻⳼⳽	Research
Peculiar Letters	2 x 2	Coptic Unicode	⳾⳿	Research
Cryptogrammic Letters	4 x 2	Coptic Unicode	ⴀⴁⴂⴃ	Research
Old Nubian Letters	4 x 2	Coptic Unicode	ⴄⴅⴆⴇ	Research
Old Nubian Punctuation Marks	2 x 2	Coptic Unicode	ⴈⴉⴊⴋ	Research

Resemblance to the Latin QWERTY layout

Typing Speed in Bohairic

This only applies to the placement of the 32 letters of the Coptic Bohairic alphabet.

Minimizing distance

The more frequent letters should be placed on the home row.

Minimizing same-finger collisions

For example, the German keyboard layout resembles the standard Latin layout, with the exception that Y and Z are swapped because the combinations “TZ” and “ZU” are frequent in German, so it was desirable for Z to be assigned to a different hand, other than that of T and U. This decision was also made because Z is far more common in German than Y, with a frequency of 1.13% for Z in comparison to 0.04% for Y.

Layout

Combining vs. Dead Keys

It has been decided not to use a [dead key](#).

Layout Reasoning

Bohairic Alphabet

Decisions

- Placing the ϫⲓⲛϧⲓⲙ was placed on the home row. This way, other fingers can move to letters while the right pinky anchors the right hand by staying on the home row. Once the other finger has typed a letter, the pinky can hit the ϫⲓⲛϧⲓⲙ while the rest of the hand restores its position.
- Diacritics are in the normal-state layer, while punctuation marks are in the Shift layer.
    - It's possible for diacritics to occur on two consecutive letters, while this isn't possible for punctuation marks.
    - Diacritics are typically more frequent.
    - Only diacritics are written mid-word.
- Outlying ⳍ and ⲩ, to reduce the load on the right pinky.
- Assigning ⲋ (rather than ⳍ) to the key of the Latin letter X. The key is more accessible, so it would have been a waste to assign it to the uncommon ⳍ not the common ⲋ.
- Assigning ⲋ to the same finger as ⲱ and ⲭ to the same finger as ⲁ (instead of the other way around), because the collisions ⲋⲱ and ⲭⲁ are less common than the collisions ⲋⲁ and ⲭⲱ. It was also done because the voice of ⲭ is more similar to that of Q.
- Assigning ⳏ to the same finger as ⲡ and ϫⲓⲛϧⲓⲙ, to avoid the collisions ⳏⲱ, ⳏⲟ, and ⳏⲓ.
- Assigning ⲑ to the same finger as ⲓ and ⲕ, to avoid the collisions ⲋ and ⲑⲟ.
- Placing Ⳏ on the number row.

Character Set Tables

Coptic unicode block

Letters (28 x 2) -> main keys + two peripheral number row keys?

Dialect / Language / Function	Name	Capital	Small	Similar Function	Similar Shape	Desktop Position	Cell Phone Position
Dialect-P	Alef	□	□	ⲁ			ⲁ
Old Coptic	Ain	□	□	ⲉ			ⲉ
Cryptogrammic	Eie	□	□	ⲏ			ⲏ
Dialect-P	Kapa	□	□	ⲕ	ⲍ		ⲕ
Dialect-P	Ni	□	□	ⲛ	ⲁ̄		ⲛ
Cryptogrammic	Ni	□	□	ⲛ			ⲛ
Old Coptic	Oou	□	□	ⲟ			ⲟ
Numeric	Sampi	ⳋ	ⳍ	ⳉ	ⲣ	ⳉ	ⳉ
Crossed	Shei	□	□	ⳉ			ⳉ
Old Coptic	Shei	□	□	ⳉ, ϭ			ⳉ
Old Coptic	Esh	□	□	ⳉ, ϭ			ⳉ
Akhmimic	Khei	□	□	ϩ, ⲫ		ϩ	ϩ
Dialect-P	Hori	□	□	ϩ			ϩ
Old Coptic	Hori	□	□	ϩ			ϩ
Old Coptic	Ha	□	□	ϩ	ⲣ		ϩ
L-Shaped	Ha	□	□	ϩ	ⲗ		ϩ

Old Coptic	Hei	⍰	⍰	ⲍ			ⲍ
Old Coptic	Hat	⍰	⍰	ⲋ			ⲋ
Old Coptic	Gangia	⍰	⍰	ⲝ			ⲝ
Old Coptic	Dja	⍰	⍰	ⲇ, ⲝ			ⲝ
Old Coptic	Shima	⍰	⍰	ⲓ, ⲃ	ⲇ		ⲃ
Old Nubian	Shima	⍰	⍰	ⲓ, ⲃ			ⲃ
Old Nubian	Ngi	⍰	⍰	ⲛ, ⲝ, ⲅ			ⲛ
Old Nubian	Nyi	⍰	⍰	ⲛ	ⲫ		ⲛ
Old Nubian	Wau	⍰	⍰	ⲟ, ⲩ, ⲱ	ⲏ		ⲩ
Cryptogrammic	Shei	⍰	⍰	ⲓ, ⲃ			ⲃ
Cryptogrammic	Gangia	⍰	⍰	ⲝ			ⲝ
Bohairic	Khei	⍰	⍰	ⲏ		ⲏ	ⲏ

Abbreviations

Character	**Desktop & Cell Phone Position**
⍰	ⲕ
ⲙ̄	ⲙ
ⲡ̄	ⲡ
ⲥ̄ⲥ	ⲥ
ⲧ̄	ⲧ
ⲭ̄	ⲭ
ⲟⲥ	ⲃ

Diacritics

Name	Character	Desktop Position	Cell Phone Position
'COPTIC COMBINING NI ABOVE' (U+2CEF)	ⲯ		Diacritics
'COPTIC COMBINING SPIRITUS ASPER' (U+2CF0)	ⲯ		Diacritics
'COPTIC COMBINING SPIRITUS LENIS' (U+2CF1)	ⲯ		Diacritics
'COPTIC OLD NUBIAN FULL STOP' (U+2CF9)	ⲹ		Punctuation
'COPTIC OLD NUBIAN DIRECT QUESTION MARK' (U+2CFA)	ⲹ		Punctuation
'COPTIC OLD NUBIAN INDIRECT QUESTION MARK' (U+2CFB)	ⲹ		Punctuation
COPTIC OLD NUBIAN VERSE DIVIDER (U+2CFC)	ⲹ		Punctuation
COPTIC FRACTION ONE HALF (U+2CFD)	ⳁ		Punctuation & Symbols
COPTIC FULL STOP (U+2CFE)	⳾		Punctuation
COPTIC MORPHOLOGICAL DIVIDER (U+2CFF)	⳿		Punctuation

Epact Numbers Thousand Mark

Name	Character	Desktop Position	Cell Phone Position
'COPTIC EPACT THOUSANDS MARK' (U+102E0)	𐋠		Diacritics & Symbols

Diacritics and Punctuation Marks

Name	Character	Desktop Position	Cell Phone Position[1]

[1] Distribute over diacritics and punctuation marks.

Orthographic Normalization

Standard Diacritics

ϫinkiⲏ

'COMBINING GRAVE ACCENT' (U+0300)

Abbreviation Marker

Candidates

- 'COMBINING MACRON' (U+0304)
- **'COMBINING OVERLINE' (U+0305)**
- 'COMBINING CONJOINING MACRON' (U+FE26)

IACS recommends either U+0304 or U+0305.
Orthographic normalization for a text in the Coptic language will typically consist of the steps below. Some of them might be unnecessary, and others might be introduced, depending on the use case.

- Converting all jinkims to the 'COMBINING GRAVE ACCENT' (U+0300).
- Converting all horizontal strokes to the 'COMBINING OVERLINE' (U+0305).
- In case non-combining symbols are used, they should be moved one step to the right (if followed by a character), in order to account for the intended order of the combining symbols.
- Changing uppercase letters to lowercase ones.

Frequencies and Collisions Statistics

N.B. This data was collected from the Bohairic version of the New Testament published by unbound.biola.edu.

Letter Frequencies[2]

Letter	Number of occurrences	Percentage
ⲉ	85285	12.73
ⲛ	71254	10.63
ⲟ	64678	9.65
ⲁ	52160	7.78
ⲓ	46372	6.92
ⲩ	39950	5.96
ⲧ	33253	4.96
ⲏ	32915	4.91
ⲥ	25218	3.76
ⲡ	22284	3.33
ⲣ	22018	3.29
ⲍ	20634	3.08
ⲱ	19299	2.88
ⲏ	18593	2.77
ⲫ	17219	2.57
ⲭ	14626	2.18
ⲯ	10565	1.58
ⲃ	10125	1.51
ⲗ	9942	1.48
ⲑ	9189	1.37

[2] Around 53.67% of the text is written in six letters only, namely ⲉ, ⲛ, ⲟ, ⲁ, ⲓ, and ⲩ.

ⲕ	8335	1.24
ⲃ	7745	1.16
ⲫ	7539	1.12
ⲑ	7291	1.09
ⲇ	4622	0.69
ⲭ	3050	0.46
ⲅ	2815	0.42
ϭ	2352	0.35
ⲍ	429	0.06
ⲝ	235	0.04
ⲩ	146	0.02
SUM	**670138**	**100%**

Heatmap[3]

Letter Adjacency Statistics

The total number of adjacent letters (called pairs in this paper) in the analyzed text of the Bohairic New Testament is **547,182**.[4]

[3] Generated from Keyboard Heatmap | Realtime heatmap visualization of text character distribution.

[4] "ⲟⲩ" alone accounts for more than 7% of the total number of occurrences. This explains why Coptic scribes often wrote the combination as a single character, which sadly doesn't exist in the unicode.

To explain how the count is taken, consider the word “ᴏʏᴏɴ”. This contains 3 pairs, namely “ᴏʏ”, “ʏᴏ”, and “ᴏɴ”.
Both “ᴏʏ” and “ʏᴏ” are placed on the same row. The sum of the number of occurrences of both pairs is the *collision* count of the pair “o” and “ʏ”.
Pairs that make up at least 1% of the text are shown below.
The full table is too long to include here, so it’s available in the appendix.

Pair	Frequency	Pair (reversed)	Frequency	Sum	Percentage	Same finger?	Adjacent fingers?	Same hand?
ᴏʏ	31004	ʏᴏ	7611	38615	7.06	FALSE	FALSE	TRUE
ɛɴ	15889	ɴɛ	7198	23087	4.22	FALSE	FALSE	FALSE
тɛ	13186	ɛт	9659	22845	4.18	FALSE	TRUE	TRUE
ɴᗅ	8927	ᗅɴ	6224	15151	2.77	FALSE	FALSE	FALSE
ɴᴏ	7523	ᴏɴ	4003	11526	2.11	FALSE	FALSE	TRUE
ꭓɛ	7897	ɛꭓ	2072	9969	1.82	FALSE	FALSE	FALSE
ɴı	6770	ıɴ	2713	9483	1.73	FALSE	TRUE	TRUE
ɛр	6192	рɛ	3271	9463	1.73	FALSE	TRUE	TRUE
пɛ	6330	ɛп	3022	9352	1.71	FALSE	FALSE	FALSE
ɛн	6643	нɛ	2565	9208	1.68	FALSE	FALSE	FALSE
тᗅ	5183	ᗅт	2728	7911	1.45	FALSE	FALSE	TRUE
ᴏс	5670	со	2102	7772	1.42	FALSE	FALSE	FALSE
ᴏƨ	5980	ƨᴏ	1665	7645	1.4	FALSE	FALSE	TRUE
пı	6667	ıп	822	7489	1.37	FALSE	FALSE	TRUE
ᗅı	5256	ıᗅ	2069	7325	1.34	FALSE	FALSE	FALSE
ᗅʏ	5327	ʏᗅ	1689	7016	1.28	FALSE	FALSE	FALSE
ᗅԛ	6451	ԛᗅ	214	6665	1.22	FALSE	FALSE	TRUE
нᴏ	4973	ᴏн	1273	6246	1.14	FALSE	FALSE	TRUE
ɴт	5972	тɴ	38	6010	1.1	FALSE	FALSE	FALSE
ɛв	4057	вɛ	1944	6001	1.1	FALSE	TRUE	TRUE
ɛԛ	4620	ԛɛ	1254	5874	1.07	FALSE	TRUE	TRUE
ᗅр	3961	рᗅ	1863	5824	1.06	FALSE	FALSE	TRUE
тᴏ	3932	ᴏт	1614	5546	1.01	FALSE	FALSE	FALSE
SUM	**178410**		**67613**	**246023**	**44.97%**	**0%**	**9.81% / 44.97%**	**26.62% / 44.97%**

Same Finger Collisions

Pairs made of the same letter, such as “нн”, aren’t treated as collisions in our calculations.
In the analyzed texts, **7.14%** of the time, a consecutive pair of letters will be written with the same finger.

Pair	Frequency	Pair (reversed)	Frequency	Sum	Percentage
оʌ	4099	ʌо	1030	5129	0.94
ки	2523	ик	1028	3551	0.65
ΔЄ	3345	ЄΔ	91	3436	0.63
кх	2488	хк	0	2488	0.45
ук	2460	ку	5	2465	0.45
сω	1700	ωс	673	2373	0.43
кг	2044	Ғк	168	2212	0.4
ки	1765	ик	239	2004	0.37
ук	1752	ку	32	1784	0.33
іК	1081	Кі	548	1629	0.3
тч	1033	чт	466	1499	0.27
Ғи	1097	иг	1	1098	0.2
фр	903	рф	195	1098	0.2
ух	947	ху	0	947	0.17
уг	767	Ғу	109	876	0.16
хΔ	547	Δх	100	647	0.12
ки	465	ик	171	636	0.12
пщ	585	цп	5	590	0.11
тр	386	рт	181	567	0.1
от	303	fо	189	492	0.09
Ғи	338	иг	135	473	0.09
рч	246	чр	214	460	0.08
сЬ	306	эс	1	307	0.06
іө	257	өі	48	305	0.06
тф	257	фт	1	258	0.05
ΔZ	162	zΔ	73	235	0.04
эω	164	ωЬ	39	203	0.04

ʏʜ	191	ʜʏ	0	191	0.03
ʙᖘ	105	ᖘʙ	63	168	0.03
ʙᴛ	121	ᴛʙ	13	134	0.02
ɵб	98	бɵ	29	127	0.02
гᖘ	72	ᖘг	55	127	0.02
ϫʜ	80	нϫ	46	126	0.02
нϫ	108	ϫʜ	0	108	0.02
ϫƧ	90	Ƨϫ	1	91	0.02
ɋф	89	фɋ	0	89	0.02
ɋʙ	59	вɋ	3	62	0.01
SUM					**7.14%**

ϫɪɴƙɪʜ Collisions

It wasn't possible to programmatically count the number of collisions of ϫɪɴƙɪʜ's. However, the following letters are notably often used with a ϫɪɴƙɪʜ. **The only collision is that of ᴨ.**

- Markers
  - Ⱨ
  - ɴ
- Vowels
  - Ɇ
  - ɭ
  - ᙣ
  - Ꙍ
- Definite articles
  - Ɵ
  - Ƭ
  - Ⲡ
  - ϕ
- Present tense markers
  - Ⲥ
  - Ⲩ
  - Ⱪ
  - Ⲭ

Adjacent Finger Collisions

In **19.43%** of the time, a letter pair will be written by adjacent (but not identical) fingers, due to the following pairs.

Pair	Frequency	Pair (reversed)	Frequency	Sum	Percentage
тє	13186	єт	9659	22845	4.18
ѵі	6770	іѵ	2713	9483	1.73
єр	6192	рє	3271	9463	1.73
єв	4057	вє	1944	6001	1.1
єч	4620	чє	1254	5874	1.07
эє	4392	єь	695	5087	0.93
сԁ	2489	ԁс	2008	4497	0.82
ƨі	3391	ік	597	3988	0.73
ні	1974	ін	1805	3779	0.69
ої	1969	іо	1783	3752	0.69
ні	2224	ін	1162	3386	0.62
се	1627	єс	1490	3117	0.57
ѵѳ	1487	ѳѵ	936	2423	0.44
ѫі	1507	іѫ	786	2293	0.42
оқ	1117	қо	1067	2184	0.4
єф	1167	фє	491	1658	0.3
уі	1591	іу	0	1591	0.29
по	953	оп	629	1582	0.29
лі	1100	іл	396	1496	0.27
ѹо	996	оѽ	387	1383	0.25
ѳо	1210	оѳ	164	1374	0.25
ѳн	1251	нѳ	61	1312	0.24
эԁ	780	ԁь	225	1005	0.18
ѳн	622	нѳ	185	807	0.15
ѵқ	548	қѵ	77	625	0.11
ге	414	єг	42	456	0.08
ѹf	346	fѹ	76	422	0.08
ҳѡ	394	ѡҳ	3	397	0.07
уқ	310	қу	75	385	0.07
чб	360	бч	0	360	0.07
қн	181	нқ	123	304	0.06
нқ	174	қн	129	303	0.06
уѳ	207	ѳу	67	274	0.05

ⱪ�ʌ	207	ʌⱪ	18	225	0.04
ɯⱥ	147	ⱥɯ	62	209	0.04
ıⱶ	141	ⱶı	63	204	0.04
ʌⱡ	121	ⱡʌ	74	195	0.04
ⱶⱡ	161	ⱡⱶ	10	171	0.03
ⱪⱬ	139	ⱬⱪ	28	167	0.03
ⱥɑɯ	75	ɯⱥ	64	139	0.03
ⱶⱪ	89	ⱪⱶ	37	126	0.02
ⱬⱥ	64	ⱥⱬ	55	119	0.02
ɓⱬ	87	ⱬɓ	19	106	0.02
тɓ	104	ɓт	0	104	0.02
ɓɯ	100	ɯɓ	0	100	0.02
cⱪ	67	ⱪc	16	83	0.02
ⱪⱪ	76	ⱪⱪ	2	78	0.01
ⱬɵ	76	ɵⱬ	0	76	0.01
ɵɯ	57	ɯɵ	9	66	0.01
cɓ	44	ɓc	10	54	0.01
ɯʲʌ	27	ʌɯ	18	45	0.01
ⱬɯ	37	ɯⱬ	0	37	0.01
SUM					**19.43%**

Same Hand Collisions

In around 50% of the time, an adjacent pair of letters will be written with the same hand. The list is too long to produce in the doc. The full statistics on letter adjacencies are available in the appendix.

Comparison to Common Latin Layouts

QWERTY

QWERTY

DVORAK

DVORAK keyboard layout

This compares to the following frequencies and heatmap for the English language.[5]

Letter	Percentage	Letter	Percentage
E	8.17	**M**	9.06
T	6.75	**F**	6.09
A	1.49	**P**	2.76
I	7.51	**Y**	6.97
N	2.78	**G**	0.98
O	1.93	**W**	0.15
S	4.25	**V**	2.36
R	0.1	**B**	0.77
L	12.7	**K**	0.15
D	5.99	**X**	4.03
H	2.23	**J**	1.97
C	6.33	**Q**	2.41
U	2.02	**Z**	0.07

Heatmap

[5] Frequencies obtained from English letter frequencies.

The two heatmaps are surprisingly similar. This is because the seven most frequent letters in English are A, T, E, I, N, O, and S; while the seven most frequent letters in Coptic are ϵ, ⲛ, ⲟ, ⲁ, ⲓ, ⲩ, and ⲧ. Six of those are counterparts, and are placed on the same location on the keyboard, namely ϵ, E; ⲛ, N; ⲟ, O; ⲁ, A; ⲓ, I; and ⲧ, T.

The two six-letter groups of counterparts constitute ~52.67% of Coptic text, and ~28.63% of English text.

References

Modernization

- [1] THOUGHTS ON THE MODERNISATION OF THE COPTIC LANGUAGE: THE SO-CALLED “SIXTH COPTIC LETTER”, CO-OU, MUST GO FROM COPTIC ALPHABET
- [2] THOUGHTS ON THE MODERNISATION OF THE COPTIC LANGUAGE: THE COPTIC NUMERICAL NOTATION SYSTEM MUST CHANGE
- [3] THOUGHTS ON THE MODERNISATION OF THE COPTIC LANGUAGE: THE COPTS MUST FIND A WORD FOR ‘ZERO’
- [4] THOUGHTS ON THE MODERNISATION OF THE COPTIC LANGUAGE: WE NEED A COPTIC WORD FOR THE ‘DECIMAL POINT’
- [5] THOUGHTS ON THE MODERNISATION OF THE COPTIC LANGUAGE: PUNCTUATION, PUNCTUATION, PUNCTUATION!

Existing Layouts

- Moheb Mekhaiel - Coptic-Unicode-Basic-Codes
- Coptic Comprehensive Unicode Test Page

QWERTY

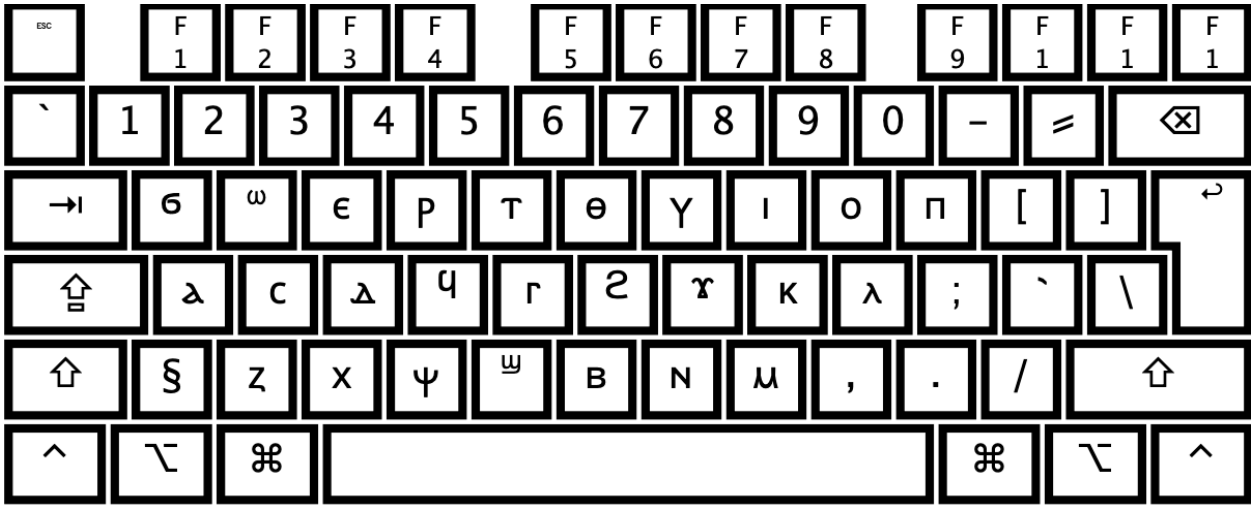
- The Curse of QWERTY

Appendix

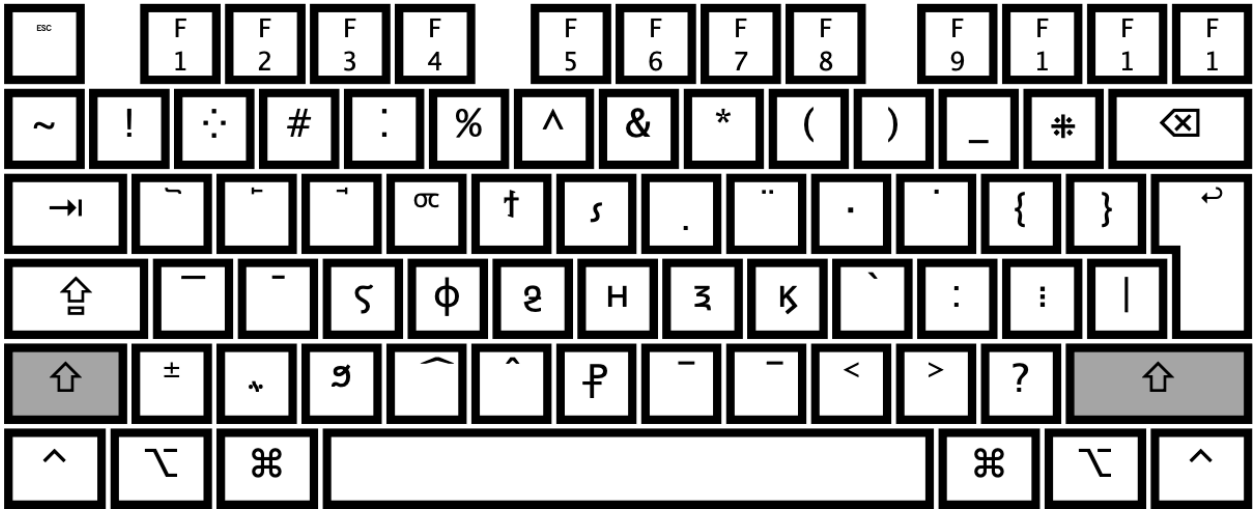
Existing Layouts

Christian Askeland[6]

State: Normal

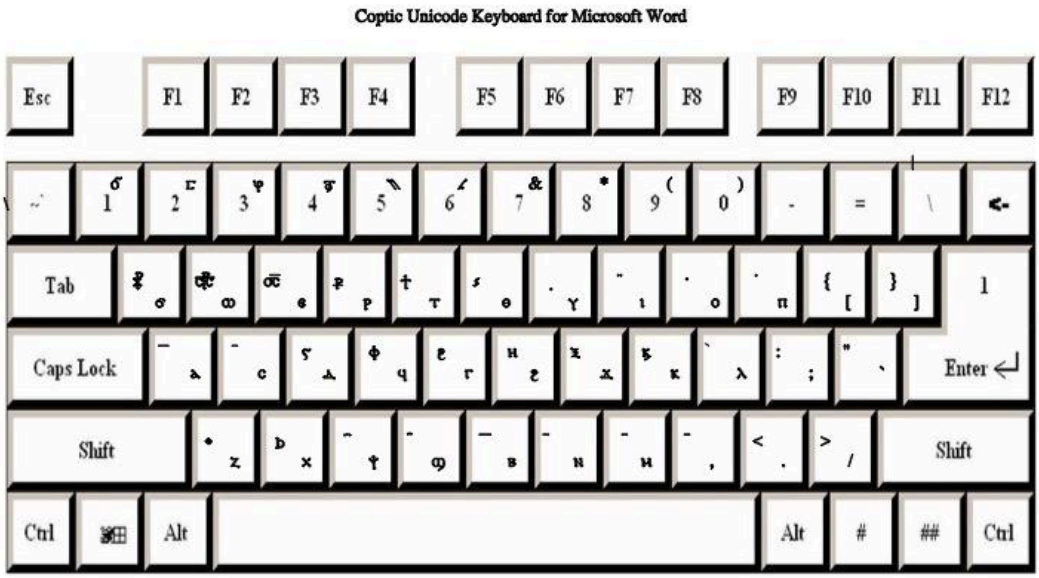


State: Shift



[6] Hany Takla: This layout is widely used in scholarly circles. It works for all dialects.

Older Layout (deprecated)



Coptic Unicode Input

[download for macOS]

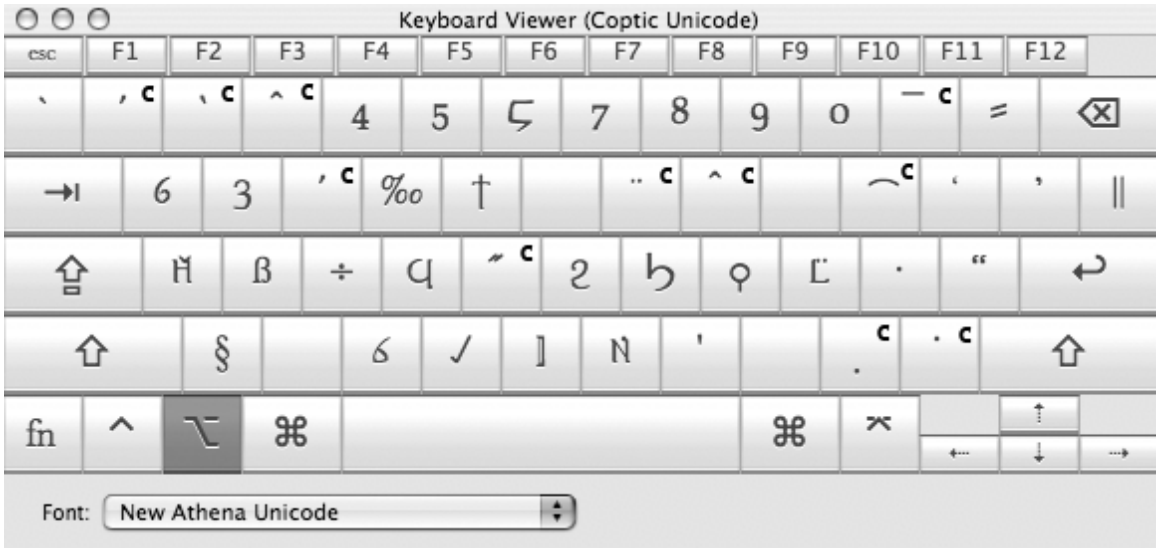
State: Normal


Keyboard Viewer (Coptic Unicode)
esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
fn
Font: New Athena Unicode

State: Shift


Keyboard Viewer (Coptic Unicode)
esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
fn
Font: New Athena Unicode

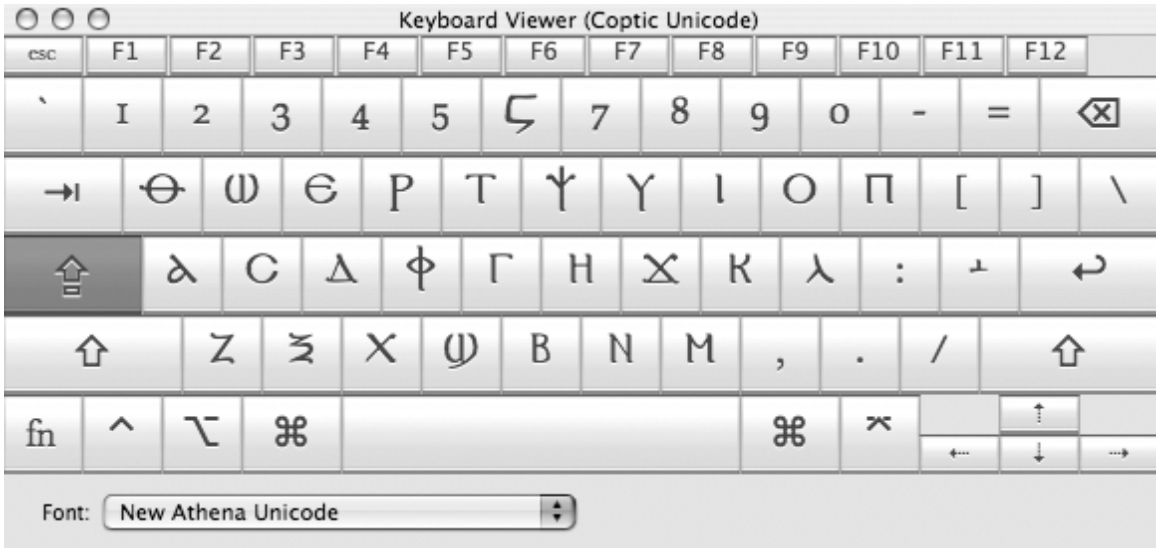
State: Option[7]



State: Option + Shift

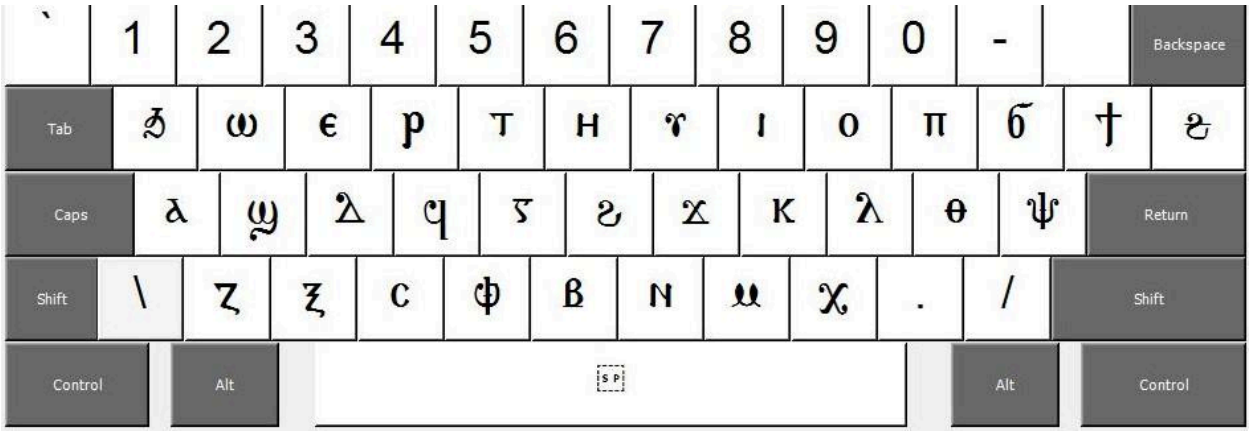
[7] A small capital C in the corner of the key indicates that this key is for a combining character that is to be typed after the character to which it is to be applied.

State: CapsLock

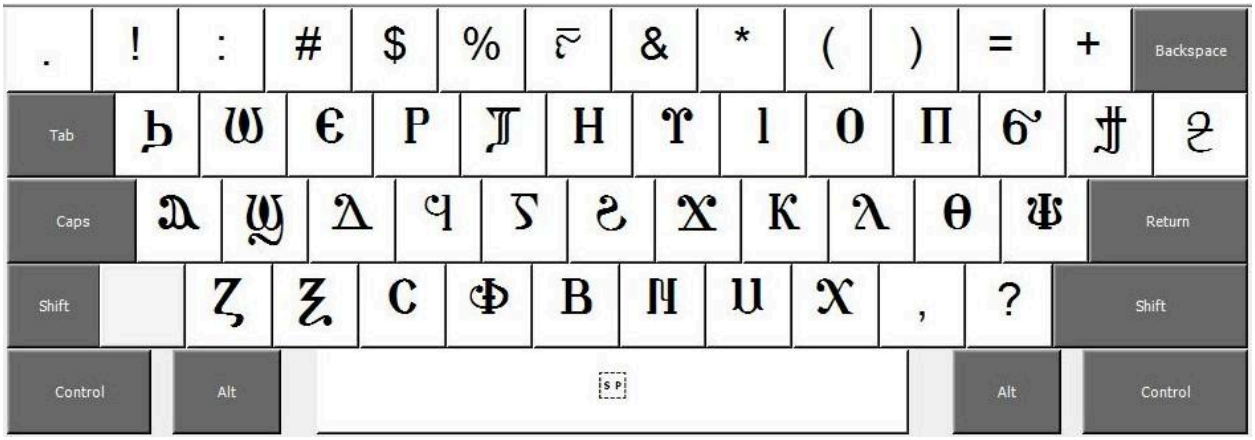


Common Keyboard

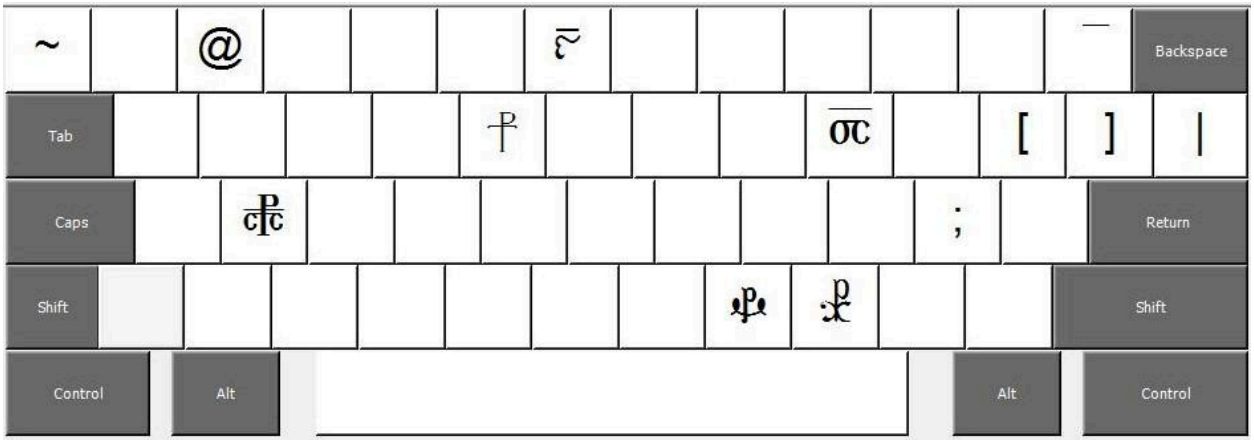
State: Normal



State: Shift



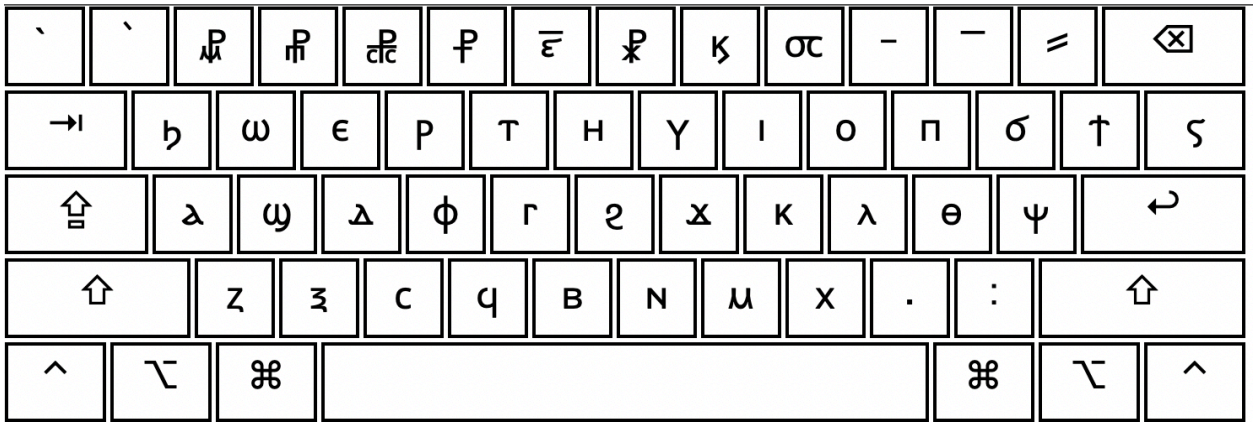
State: Alt + Ctrl


~
@
Backspace
Tab
[
]
Caps
;
Return
Shift
Shift
Control
Alt
Alt
Control

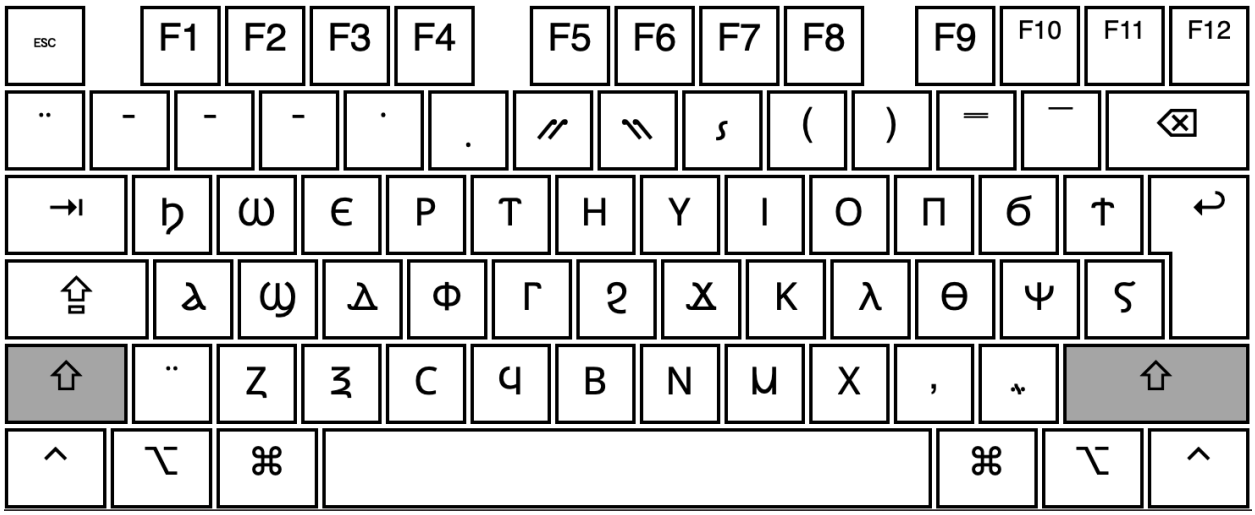
Mina Makar's macOS Keyboard

Mina: I do not recommend changing this layout as it is the most efficient. And everyone has been using it for a long time now.
Mina: The digits are useless in Coptic. And on max you can easily change keyboards with shortcuts. So it doesn't take much effort.

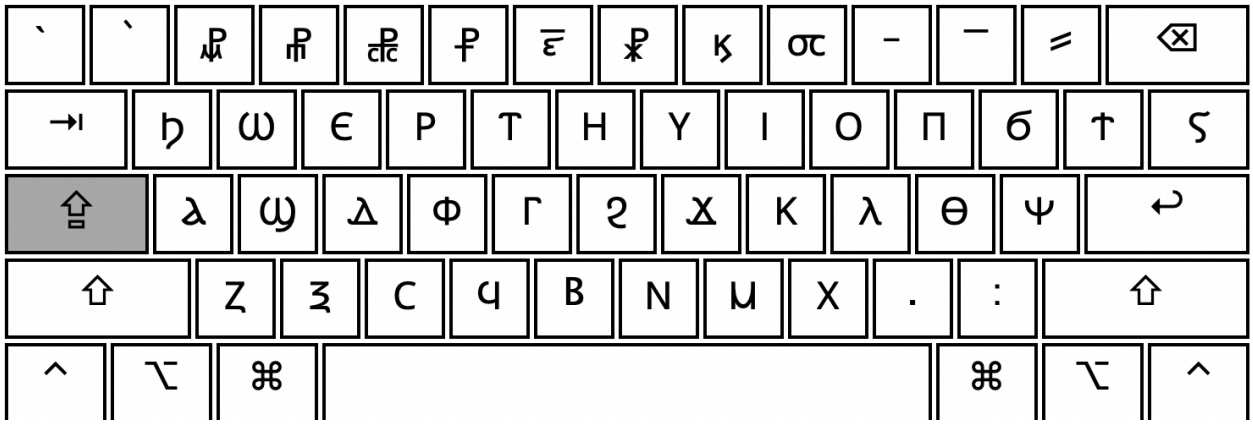
State: Normal



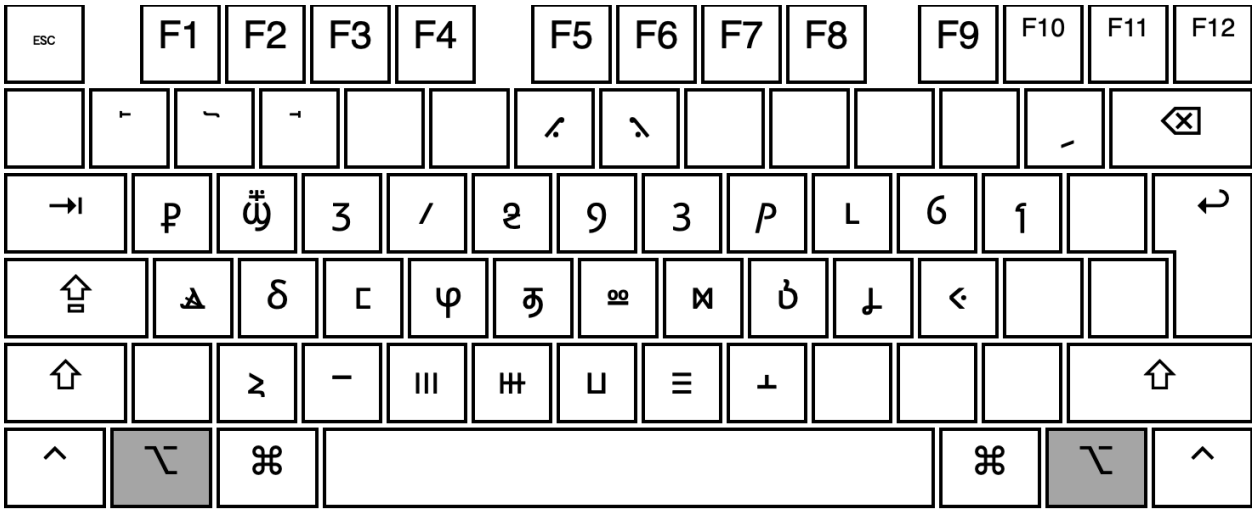
State: Shift



State: Caps Lock



State: Option

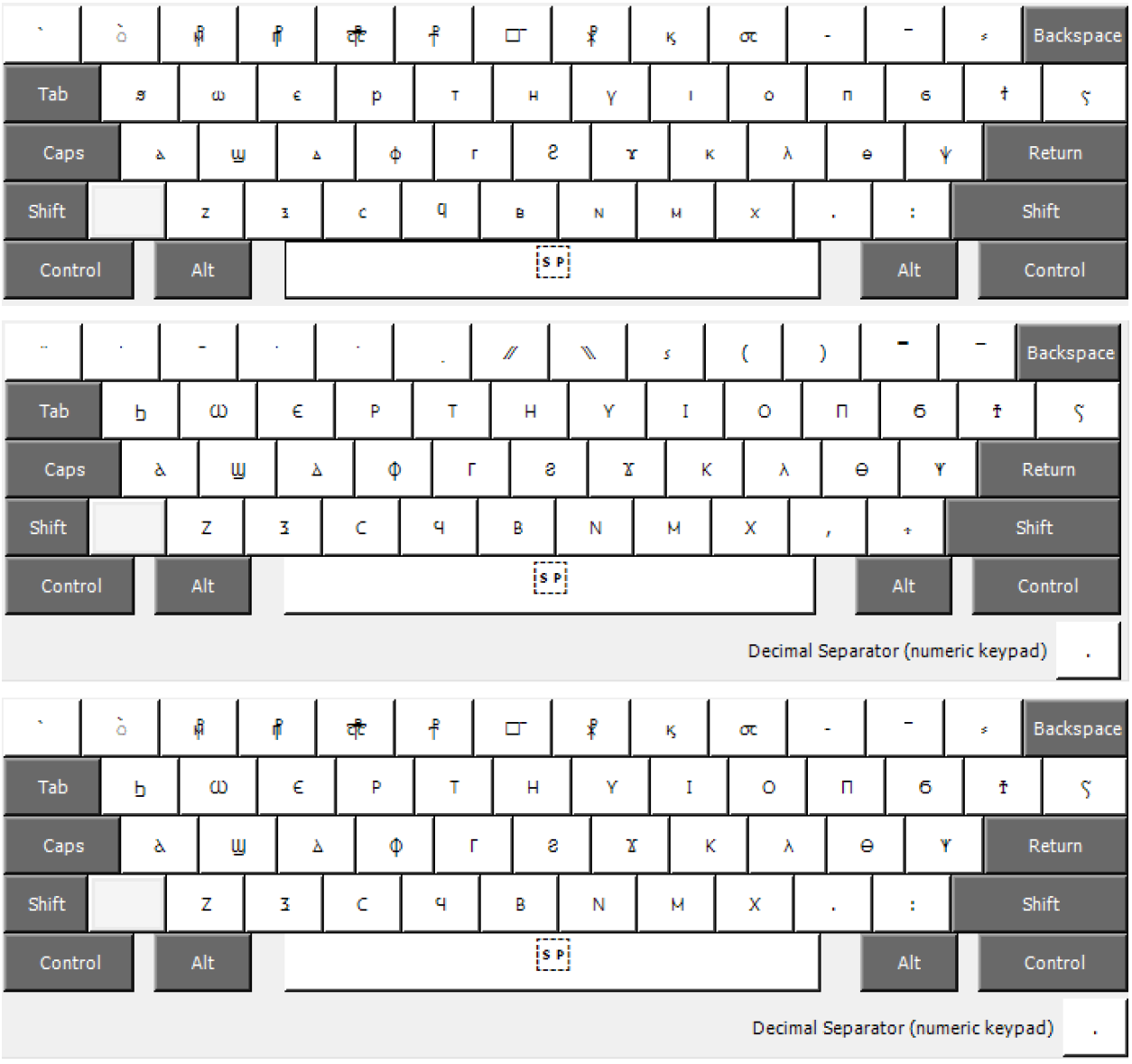


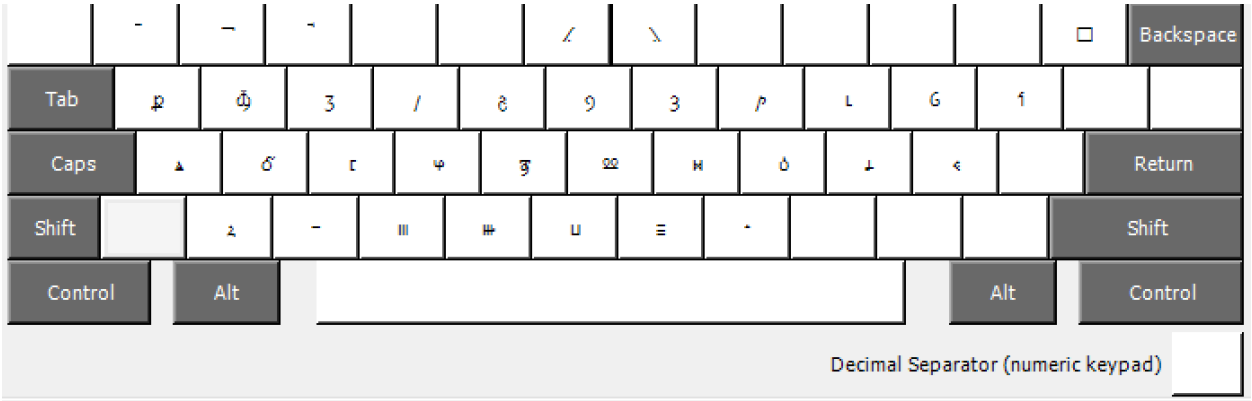
State: Option + Shift

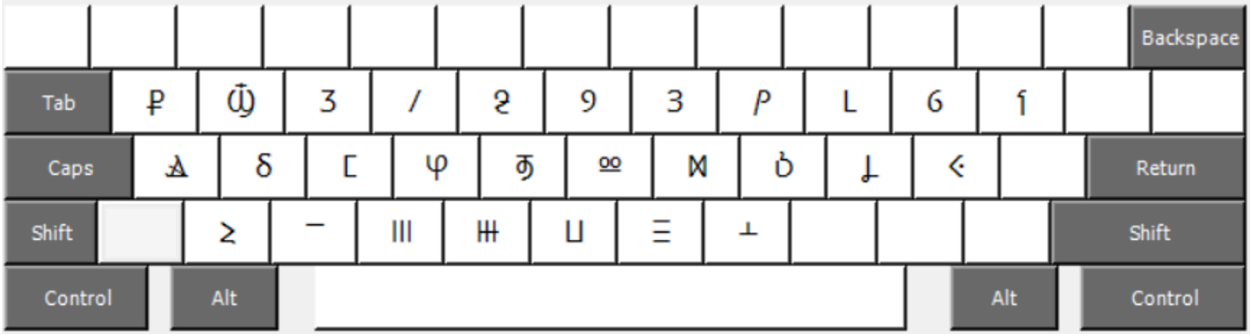
Suggested Repositionings

- ʒ, ⵅ, ʏ, ŧ, ɕ, ɵ
- Diacritics

[Mina Makar's Windows Keyboard]

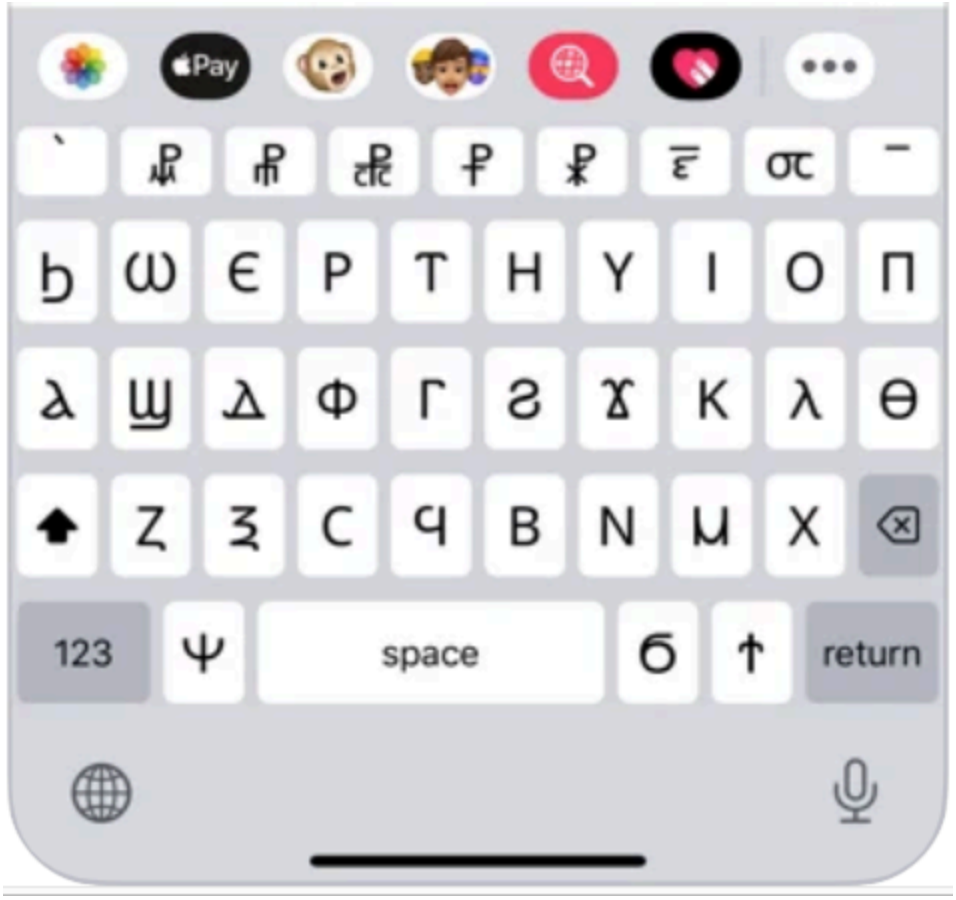



Backspace
Tab
Caps
Return
Shift
Shift
Control
Alt
Alt
Control
Decimal Separator (numeric keypad)

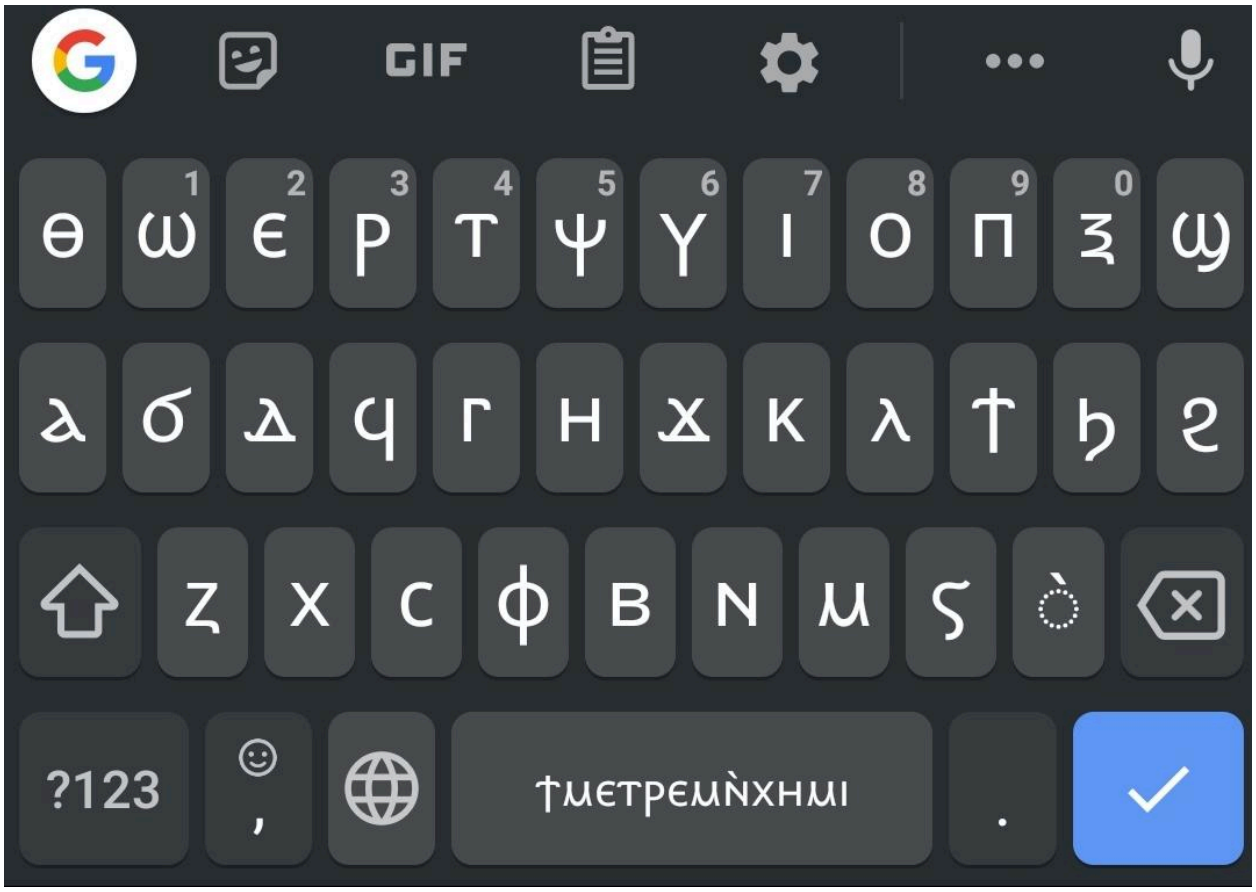

Backspace
Tab
Caps
Return
Shift
Shift
Control
Alt
Alt
Control

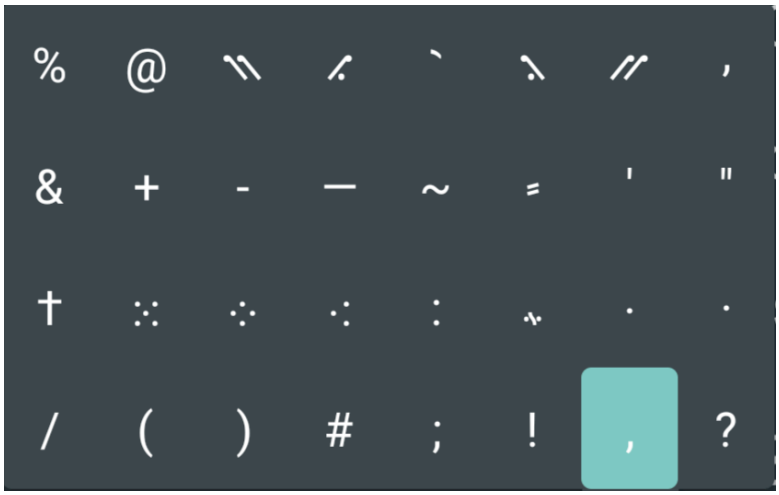
Mina Makar’s iOS Keyboard

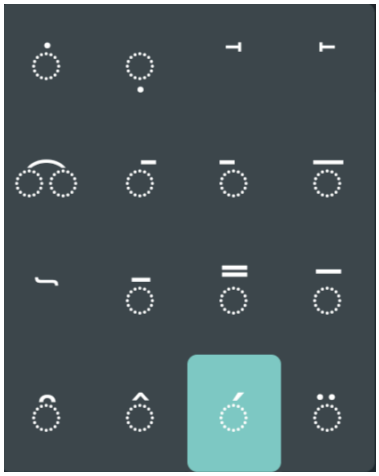
Mina: I would not change the layouts I created, especially for phones. They were rigorously tested by several users who provided practical feedback. The layout is the final product of what was the most understandable and easily usable version designed with ease of typing.



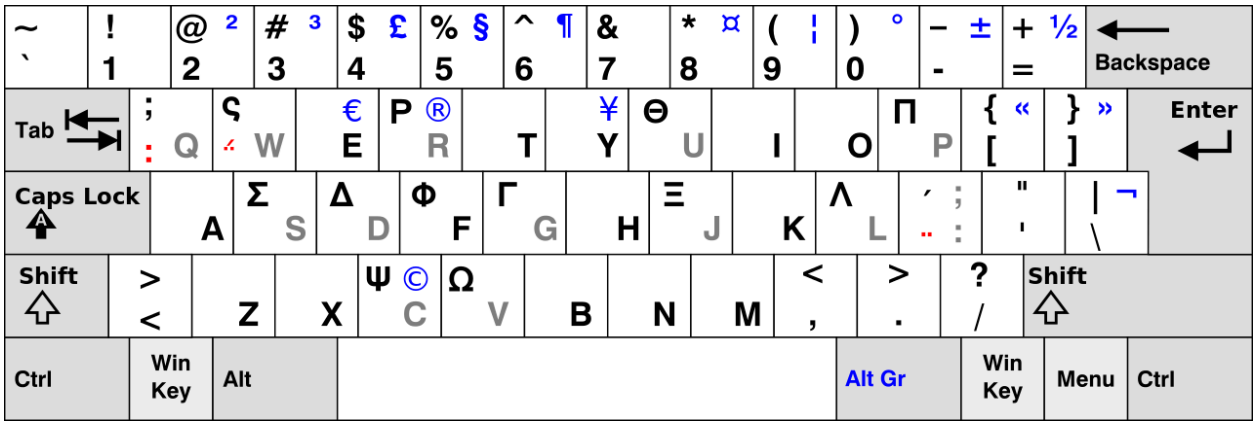
[Android Gboard]







Greek Keyboard



Russian Keyboard

Remarks about Major OS's

Problematic Combinations

MacOS

- Google Docs
    - Option + /
    - Option + shift + k
    - Option + shift + `
- Gmail
    - None
- TextEdit
    - None
- Pages
    - None

Windows

-

Hot Keys

Windows

- Mina Makar: You can setup hotkeys to switch between keyboards on windows. You can make ctr+1 go to english, ctr+2 go to coptic, ctr+3 go to arabic, … and so on.

Fonts

Diacritics

Ideally, we want the following set of diacritics to be supported in all fonts:

- 'COMBINING GRAVE ACCENT' (U+0300): ⲇ̀
- 'COMBINING ACUTE ACCENT' (U+0301): ⲇ́
- 'COMBINING CIRCUMFLEX ACCENT' (U+0302): ⲇ̂
- 'COMBINING MACRON' (U+0304): ⲇ̄
- 'COMBINING OVERLINE' (U+0305): ⲇ̅
- 'COMBINING DOT ABOVE' (U+0307): ⲇ̇
- 'COMBINING DIAERESIS' (U+0308): ⲇ̈
- 'COMBINING INVERTED BREVE' (U+0311): ⲇ̑
- 'COMBINING DOT BELOW' (U+0323): ⲇ̣
- 'COMBINING DOUBLE OVERLINE' (U+033F): ⲇ̿
- 'COMBINING DOUBLE MACRON' (U+035E): ⲇ͞ⲇ
- 'COMBINING DOUBLE INVERTED BREVE' (U+0361): ⲇ͡ⲇ
- 'COMBINING DOUBLE CIRCUMFLEX ABOVE' (U+1DCD): ⲇ᷍ⲇ
- 'COMBINING MACRON LEFT HALF' (U+FE24): ⲇ
- 'COMBINING MACRON RIGHT HALF' (U+FE25): ⲇ
- 'COMBINING CONJOINING MACRON' (U+FE26): ⲇ

Noto Sans

There are a few open issues. It's being actively updated.

Antinoou

Hany Takla: It is much superior to any unicode font that was made so far for Coptic.

New Athena

The following diacritics are NOT supported:

- 'COMBINING DOUBLE CIRCUMFLEX ABOVE' (U+1DCD): ⲇ᷍ⲇ
- 'COMBINING MACRON LEFT HALF' (U+FE24): ⲇ
- 'COMBINING MACRON RIGHT HALF' (U+FE25): ⲇ
- 'COMBINING CONJOINING MACRON' (U+FE26): ⲇ

Known Rendering Issues in Major OS’s

Google

Noto Sans

Bishoy: I believe it renders everything properly.

Cross-platform Chromium Issues (with combining diacritics)

Android WebView Issues (with demotic characters)

Microsoft

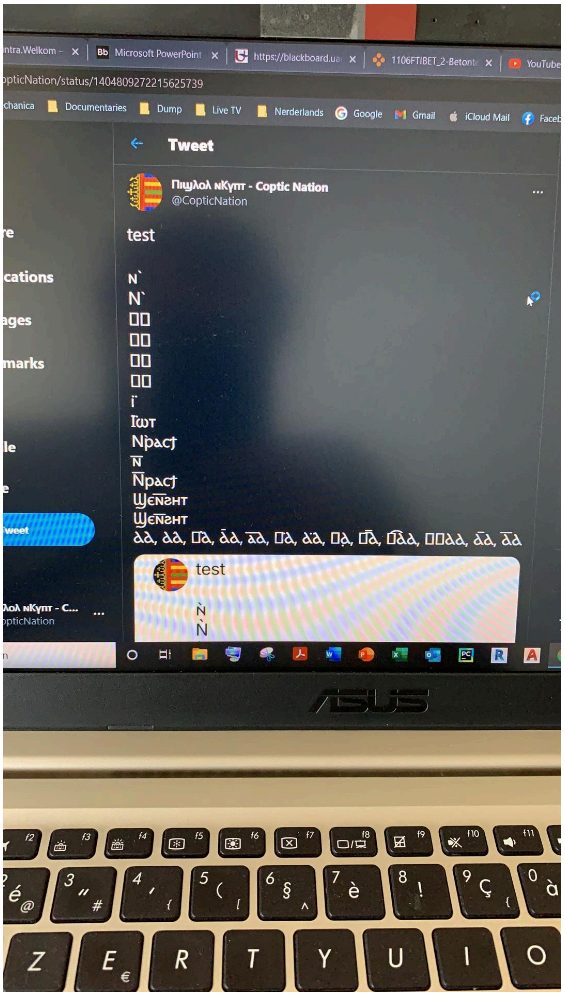
Windows File System (with combining diacritics)

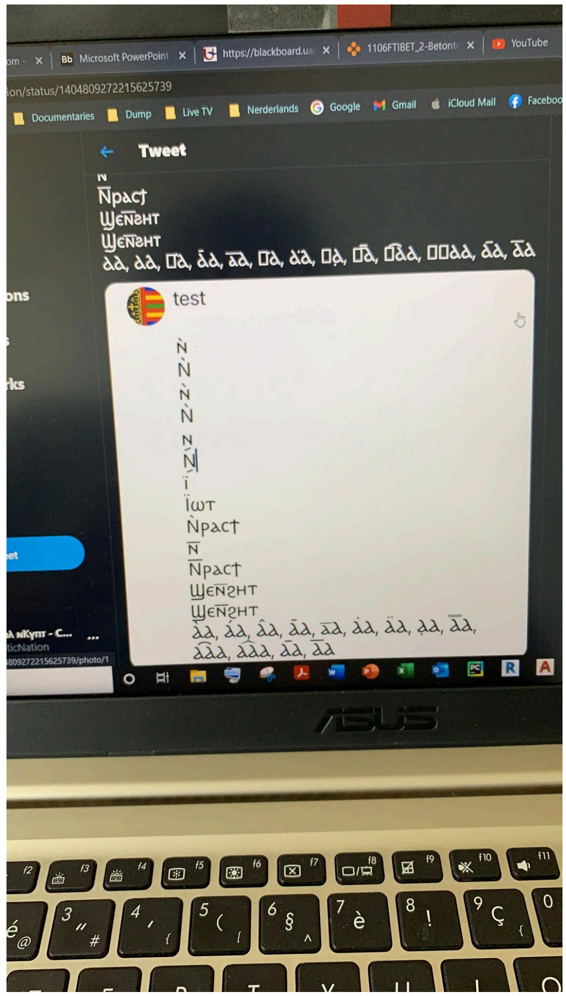
Mina Makar:
Windows doesn't render Unicode in their operating system like Apple. I would work on getting them to update their Unicode rendering first.
But the keyboard works and if you have a Unicode font installed that supports all the Unicode in the keyboard it will render.
Antinoou so far is the only one that can.
I mean actually using Coptic Unicode on windows itself doesn't always render.
Like searching or on Microsoft edge.
The issue is that I can use Unicode throughout my Mac and to save files and everything renders. But on windows not everything will render. Like if I want to save my file ⲉ̀ⲛ in windows it will not read it but on mac it will.
I am not talking about apps. I am talking about the Microsoft OS itself not handling unicode.
The OS supports an older version of Unicode and I told them to update it but they didn't seem to care.
Mostly because it is something that only affects a small subset of people.
It will not show demotic characters and it will not combine the letters with certain diacritics.
Office is separate.
Because that depends on installed fonts.
They have to be using a system font that supports all the unicode.
It depends on what font they are using and if it can render all the diacritics and characters.
Office does a good job but even the standard fonts they have like Noto Sans does not support all of them.
It really depends on the fonts used.
But there is also a rendering issue because I had one with FB before.
FB on desktop would support ⲁ̀ but not on mobile.
They would support the other jinkim ⲁ̀. They would render ⳩.
Antinoou is the only font that was designed to handle all the unicode diacritic combinations used in all the dialects.

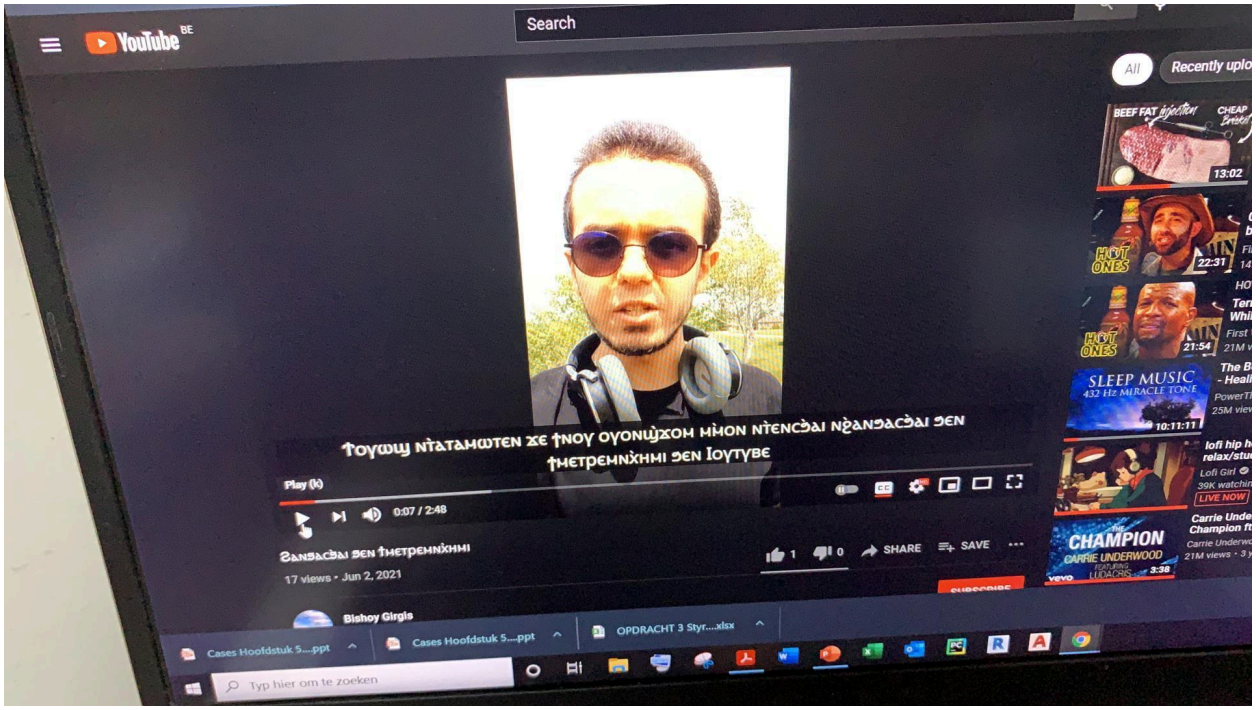
But even without that you should be able to do it with system font. like this ⲁ̣̀□□□. Look how many things I added lol!

Reversing the order for diacritics

Diacritics show on the following, rather than the preceding, letter.
See below. The picture on the right is a screenshot of the same text from an iPhone device.





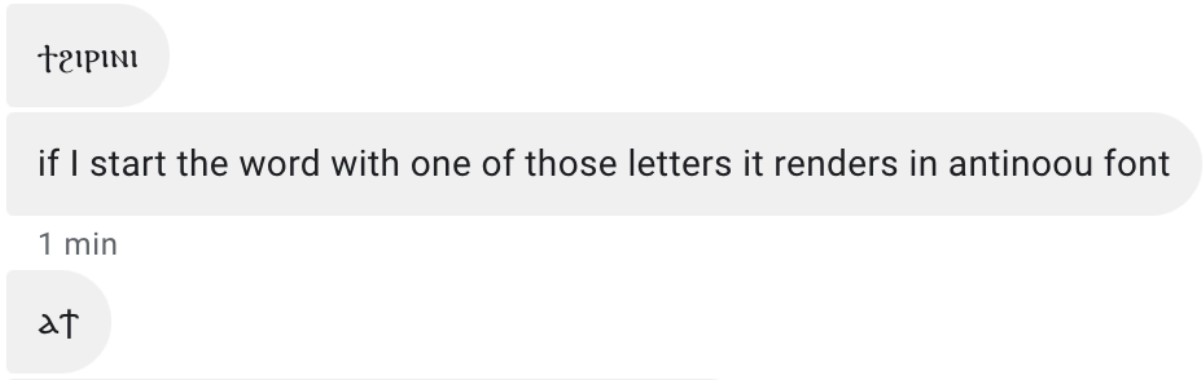


Apple

Behavior of Custom Coptic Fonts on macOS and iOS

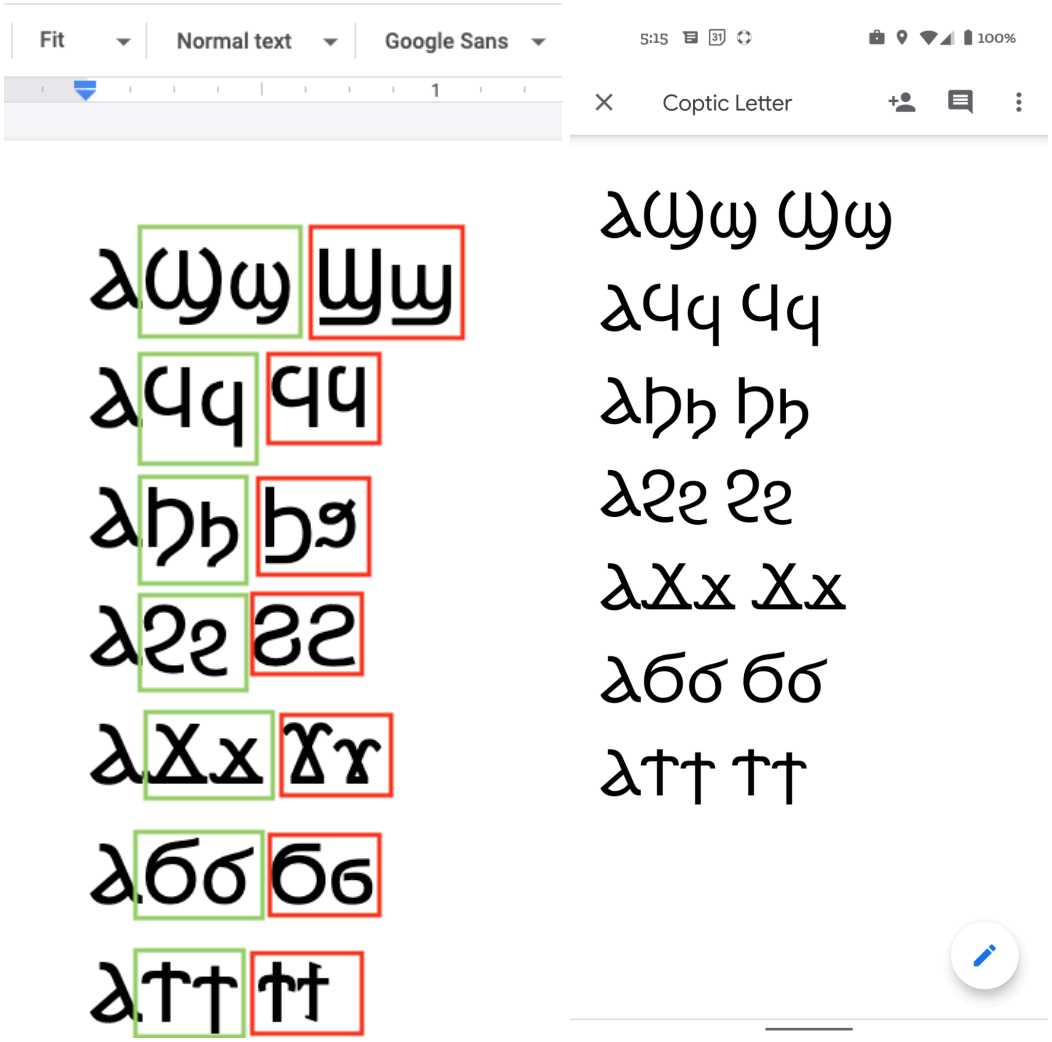
- **Antinoou**

Mina Makar: If you have *Antinoou* font installed, type any of the letters found in the Greek unicode block. If I start the word with one of those letters it renders in *Antinoou* font. Otherwise it renders in unicode block font. You can do this in Chrome as well. It's an interesting phenomenon and I don't understand why it does that. But if you don't have the font installed you will not see what I am talking about because it will render it like the unicode block. I don't understand why it does this for those letters but not all. it would be cool if it just rendered everything as *Antinoou*. This is something if Apple updated, would be super cool.
You can test the theory by typing in greek and seeing if it renders in *Antinoou* font, Since they are from the same block. But it doesn't lol so what's special about those seven letters. If you install *Antinoou* on an iPhone it does the same thing so I had to delete it.
Because it looks so weird lol.



- **Noto Sans**

See the image below on the left. Words starting with a Greek-origin letter are rendered in Sans. Words starting with anything else are rendered regularly.



Find, to the right, the same document opened on Android. Everything is rendered in Sans.

Letter Pair Frequency in the Coptic New Testament

Pair	Frequency	Pair (reversed)	Frequency	Sum	Percentage	Same finger?	Adjacent fingers?	Same hand?
ⲟⲩ	31004	ⲩⲟ	7611	38615	7.06	FALSE	FALSE	TRUE
ⲉⲛ	15889	ⲛⲉ	7198	23087	4.22	FALSE	FALSE	FALSE
ⲧⲉ	13186	ⲉⲧ	9659	22845	4.18	FALSE	TRUE	TRUE
ⲛⲁ	8927	ⲁⲛ	6224	15151	2.77	FALSE	FALSE	FALSE
ⲛⲟ	7523	ⲟⲛ	4003	11526	2.11	FALSE	FALSE	TRUE
ϫⲉ	7897	ⲉϫ	2072	9969	1.82	FALSE	FALSE	FALSE
ⲛⲓ	6770	ⲓⲛ	2713	9483	1.73	FALSE	TRUE	TRUE
ⲉⲣ	6192	ⲣⲉ	3271	9463	1.73	FALSE	TRUE	TRUE
ⲡⲉ	6330	ⲉⲡ	3022	9352	1.71	FALSE	FALSE	FALSE
ⲉⲏ	6643	ⲏⲉ	2565	9208	1.68	FALSE	FALSE	FALSE
ⲧⲁ	5183	ⲁⲧ	2728	7911	1.45	FALSE	FALSE	TRUE
ⲟⲥ	5670	ⲥⲟ	2102	7772	1.42	FALSE	FALSE	FALSE
ⲟⲩ	5980	ⲩⲟ	1665	7645	1.4	FALSE	FALSE	TRUE
ⲡⲓ	6667	ⲓⲡ	822	7489	1.37	FALSE	FALSE	TRUE
ⲁⲓ	5256	ⲓⲁ	2069	7325	1.34	FALSE	FALSE	FALSE
ⲁⲩ	5327	ⲩⲁ	1689	7016	1.28	FALSE	FALSE	FALSE
ⲁϥ	6451	ϥⲁ	214	6665	1.22	FALSE	FALSE	TRUE
ⲏⲟ	4973	ⲟⲏ	1273	6246	1.14	FALSE	FALSE	TRUE
ⲛⲧ	5972	ⲧⲛ	38	6010	1.1	FALSE	FALSE	FALSE
ⲉⲃ	4057	ⲃⲉ	1944	6001	1.1	FALSE	TRUE	TRUE
ⲉϥ	4620	ϥⲉ	1254	5874	1.07	FALSE	TRUE	TRUE
ⲁⲣ	3961	ⲣⲁ	1863	5824	1.06	FALSE	FALSE	TRUE
ⲧⲟ	3932	ⲟⲧ	1614	5546	1.01	FALSE	FALSE	FALSE
ⲏⲁ	4005	ⲁⲏ	1209	5214	0.95	FALSE	FALSE	FALSE
ⲟⲗ	4099	ⲗⲟ	1030	5129	0.94	TRUE	FALSE	TRUE
ⲉⲉ	4392	ⲉϧ	695	5087	0.93	FALSE	TRUE	TRUE
ⲓⲥ	3867	ⲥⲓ	1197	5064	0.93	FALSE	FALSE	FALSE
ⲣⲟ	4014	ⲟⲣ	680	4694	0.86	FALSE	FALSE	FALSE

ᴄᗅ	2489	ᗅᴄ	2008	4497	0.82	FALSE	TRUE	TRUE
ᔕᗅ	2455	ᗅᔕ	1957	4412	0.81	FALSE	FALSE	FALSE
ʙᴏ	3850	ᴏʙ	414	4264	0.78	FALSE	FALSE	FALSE
ʜʜ	4182	ʜʜ	4182	4182	0.76	FALSE	FALSE	FALSE
ᑭı	2678	ıᑭ	1477	4155	0.76	FALSE	FALSE	FALSE
ᑭʜ	2272	ʜᑭ	1824	4096	0.75	FALSE	FALSE	FALSE
ᔕı	3391	ıᔕ	597	3988	0.73	FALSE	TRUE	TRUE
ᘺᴏ	3890	ᴏᘺ	0	3890	0.71	FALSE	FALSE	FALSE
ᴇʏ	2635	ʏᴇ	1206	3841	0.7	FALSE	FALSE	FALSE
ʜı	1974	ıʜ	1805	3779	0.69	FALSE	TRUE	TRUE
ᘺᴛ	3100	ᴛᘺ	654	3754	0.69	FALSE	FALSE	TRUE
ᴏı	1969	ıᴏ	1783	3752	0.69	FALSE	TRUE	TRUE
ʜᑎ	3653	ᑎʜ	19	3672	0.67	FALSE	FALSE	TRUE
ʜᴛ	1815	ᴛʜ	1745	3560	0.65	FALSE	FALSE	FALSE
ɴʜ	2523	ʜɴ	1028	3551	0.65	TRUE	FALSE	TRUE
ᐞᴇ	3345	ᴇᐞ	91	3436	0.63	TRUE	FALSE	TRUE
ʜı	2224	ıʜ	1162	3386	0.62	FALSE	TRUE	TRUE
ᘺɴ	1737	ɴᘺ	1385	3122	0.57	FALSE	FALSE	FALSE
ᴄᴇ	1627	ᴇᴄ	1490	3117	0.57	FALSE	TRUE	TRUE
ᴇᴓ	2686	ᴓᴇ	372	3058	0.56	FALSE	FALSE	FALSE
ɴɴ	3034	ɴɴ	3034	3034	0.55	FALSE	FALSE	FALSE
ᴏɋ	2280	ɋᴏ	752	3032	0.55	FALSE	FALSE	FALSE
ᗅᏁ	1841	ʎᗅ	1156	2997	0.55	FALSE	FALSE	FALSE
ᑎᗅ	2045	ᗅᑎ	917	2962	0.54	FALSE	FALSE	FALSE
ʜᘺ	1501	ᘺʜ	1458	2959	0.54	FALSE	FALSE	FALSE
ıᴇ	1694	ᴇı	1143	2837	0.52	FALSE	FALSE	FALSE
ᴇᔕ	1881	ᔕᴇ	838	2719	0.5	FALSE	FALSE	FALSE
ʞᗅ	1371	ᗅʞ	1262	2633	0.48	FALSE	FALSE	FALSE
ʜᴄ	2096	ᴄʜ	533	2629	0.48	FALSE	FALSE	FALSE
ᑭᘺ	1982	ᘺᑭ	622	2604	0.48	FALSE	FALSE	TRUE
ⱡᒧᗅ	1473	ᗅᘺ	1031	2504	0.46	FALSE	FALSE	FALSE
ʏᴄ	2323	ᴄʏ	166	2489	0.45	FALSE	FALSE	FALSE
ɴx	2488	ᵡɴ	0	2488	0.45	TRUE	FALSE	TRUE
ɴᴄ	2014	ᴄɴ	463	2477	0.45	FALSE	FALSE	FALSE

ʏɴ	2460	ɴʏ	5	2465	0.45	TRUE	FALSE	TRUE
ɴθ	1487	θɴ	936	2423	0.44	FALSE	TRUE	TRUE
ɯɣɷ	1787	ɷɋ	632	2419	0.44	FALSE	FALSE	FALSE
cɷ	1700	ɷc	673	2373	0.43	TRUE	FALSE	TRUE
ɤɪ	1507	ɪɤ	786	2293	0.42	FALSE	TRUE	TRUE
ɴƨ	2044	ƨɴ	168	2212	0.4	TRUE	FALSE	TRUE
ɵƙ	1153	ƙɵ	1036	2189	0.4	FALSE	FALSE	FALSE
oƙ	1117	ƙo	1067	2184	0.4	FALSE	TRUE	TRUE
ɯjɛ	1221	ɵɋ	885	2106	0.38	FALSE	FALSE	FALSE
ɯɹ	1061	ɪɋ	1044	2105	0.38	FALSE	FALSE	TRUE
ɪт	1632	тɪ	472	2104	0.38	FALSE	FALSE	FALSE
ɾɷ	1359	ɷɾ	740	2099	0.38	FALSE	FALSE	TRUE
ɤɷ	1986	ɷɤ	96	2082	0.38	FALSE	FALSE	FALSE
ɷɤ	1241	ɤɷ	829	2070	0.38	FALSE	FALSE	FALSE
ɪɷ	1148	ɷɪ	885	2033	0.37	FALSE	FALSE	FALSE
ʜн	1765	нʜ	239	2004	0.37	TRUE	FALSE	TRUE
фн	1915	нф	44	1959	0.36	FALSE	FALSE	FALSE
cт	1118	тc	823	1941	0.35	FALSE	FALSE	TRUE
ʏŧ	1832	ŧʏ	0	1832	0.33	FALSE	FALSE	TRUE
ɪв	1110	вɪ	676	1786	0.33	FALSE	FALSE	FALSE
ʏʜ	1752	ʜʏ	32	1784	0.33	TRUE	FALSE	TRUE
фɴ	1482	ɴф	247	1729	0.32	FALSE	FALSE	FALSE
ʏɷ	1616	ɷʏ	80	1696	0.31	FALSE	FALSE	FALSE
ɴп	1243	пɴ	434	1677	0.31	FALSE	FALSE	TRUE
ɵф	1167	фɛ	491	1658	0.3	FALSE	TRUE	TRUE
ɷп	1378	пɷ	265	1643	0.3	FALSE	FALSE	FALSE
фɷ	1308	ɷф	331	1639	0.3	FALSE	FALSE	TRUE
ɪƙ	1081	кɪ	548	1629	0.3	TRUE	FALSE	TRUE
ʏɪ	1591	ɪʏ	0	1591	0.29	FALSE	TRUE	TRUE
пo	953	оп	629	1582	0.29	FALSE	TRUE	TRUE
ɵo	1548	оɛ	5	1553	0.28	FALSE	FALSE	FALSE
ɤo	1192	оɤ	308	1500	0.27	FALSE	FALSE	TRUE
тч	1033	чт	466	1499	0.27	TRUE	FALSE	TRUE
ʏɪ	1100	ɪʏ	396	1496	0.27	FALSE	TRUE	TRUE

⊇ɷ	1454	ɯɾ	29	1483	0.27	FALSE	FALSE	FALSE
ⱡʁ	867	ʁⱡ	577	1444	0.26	FALSE	FALSE	TRUE
ʜɸ	1186	ɸʜ	258	1444	0.26	FALSE	FALSE	FALSE
ʜo	1386	oʜ	16	1402	0.26	FALSE	FALSE	TRUE
ⱬjo	996	oɰ	387	1383	0.25	FALSE	TRUE	TRUE
ɵo	1210	oɵ	164	1374	0.25	FALSE	TRUE	TRUE
ʌɬ	772	ɬɴ	559	1331	0.24	FALSE	FALSE	TRUE
ɯʁ	704	ʁɯ	611	1315	0.24	FALSE	FALSE	TRUE
ɵʜ	1251	ʜɵ	61	1312	0.24	FALSE	TRUE	TRUE
⊇ᑭ	660	ᑭɾ	540	1200	0.22	FALSE	FALSE	FALSE
ɛʎ	812	ʏɛ	379	1191	0.22	FALSE	FALSE	FALSE
ᵡᑭ	803	ᑭᵡ	384	1187	0.22	FALSE	FALSE	TRUE
ɛɬ	928	ɬɛ	230	1158	0.21	FALSE	FALSE	FALSE
ʌƀ	1147	ɜɴ	0	1147	0.21	FALSE	FALSE	FALSE
ɛⱡ	673	ⱡɛ	469	1142	0.21	FALSE	FALSE	TRUE
ᑫı	798	ıɥ	312	1110	0.2	FALSE	FALSE	FALSE
ⱬʜ	605	ʜɰ	504	1109	0.2	FALSE	FALSE	TRUE
ᑭп	677	пᑭ	429	1106	0.2	FALSE	FALSE	FALSE
⊇ʜ	1097	ʜɾ	1	1098	0.2	TRUE	FALSE	TRUE
ɸᑭ	903	ᑭɸ	195	1098	0.2	TRUE	FALSE	TRUE
ʏт	1039	тʏ	50	1089	0.2	FALSE	FALSE	FALSE
ʜɬ	1056	ɬʜ	0	1056	0.19	FALSE	FALSE	TRUE
ᑫɴ	645	ɴɥ	370	1015	0.19	FALSE	FALSE	FALSE
ɜⱡ	780	ⱡƀ	225	1005	0.18	FALSE	TRUE	TRUE
ᑫⱬ	875	ⱬᑫ	128	1003	0.18	FALSE	FALSE	FALSE
ɴᑭ	709	ᑭɴ	289	998	0.18	FALSE	FALSE	FALSE
ʏɰ	994	ⱬʏ	0	994	0.18	FALSE	FALSE	TRUE
cʜ	613	ʜc	365	978	0.18	FALSE	FALSE	FALSE
ⱡɵ	571	ɵⱡ	386	957	0.17	FALSE	FALSE	FALSE
ʏx	947	ᵡʏ	0	947	0.17	TRUE	FALSE	TRUE
ʞɷ	497	ɯʞ	447	944	0.17	FALSE	FALSE	FALSE
ɓı	816	ıɓ	113	929	0.17	FALSE	FALSE	FALSE
ɓo	868	oɓ	45	913	0.17	FALSE	FALSE	FALSE
⊇ɬ	523	ɬ⊇	387	910	0.17	FALSE	FALSE	TRUE

⅄H	703	H⅄	202	905	0.17	FALSE	FALSE	TRUE
ꟽX	865	Xꟽ	22	887	0.16	FALSE	FALSE	FALSE
Yƨ	767	ƧY	109	876	0.16	TRUE	FALSE	TRUE
⅄T	527	Tꟻ	325	852	0.16	FALSE	FALSE	FALSE
YP	847	PY	1	848	0.15	FALSE	FALSE	FALSE
Nꟻ	802	⅄N	43	845	0.15	FALSE	FALSE	TRUE
ӨB	844	BӨ	0	844	0.15	FALSE	FALSE	FALSE
⅄⅄	816	⅄⅄	816	816	0.15	FALSE	FALSE	FALSE
ӨH	622	HӨ	185	807	0.15	FALSE	TRUE	TRUE
Өꟼ	804	ꟼӨ	3	807	0.15	FALSE	FALSE	FALSE
ꟽC	715	Cꟽ	84	799	0.15	FALSE	FALSE	TRUE
ꟽH	701	Hꟽ	72	773	0.14	FALSE	FALSE	FALSE
ӨP	687	PӨ	50	737	0.13	FALSE	FALSE	FALSE
ϮH	639	HϮ	94	733	0.13	FALSE	FALSE	TRUE
ꟼꟽ	515	ꟽꟼ	196	711	0.13	FALSE	FALSE	TRUE
YƋ	684	ƋY	5	689	0.13	FALSE	FALSE	FALSE
ƎH	685	Hь	1	686	0.13	FALSE	FALSE	FALSE
Ǝo	674	oь	1	675	0.12	FALSE	FALSE	FALSE
XⱭ	547	ⱭX	100	647	0.12	TRUE	FALSE	TRUE
BH	519	HB	127	646	0.12	FALSE	FALSE	FALSE
NH	465	HN	171	636	0.12	TRUE	FALSE	TRUE
XH	620	HX	7	627	0.11	FALSE	FALSE	FALSE
ϕı	355	ıϕ	272	627	0.11	FALSE	FALSE	FALSE
NK	548	KN	77	625	0.11	FALSE	TRUE	TRUE
ϕo	352	oϕ	262	614	0.11	FALSE	FALSE	FALSE
ꟽƧ	487	Ƨꟽ	110	597	0.11	FALSE	FALSE	FALSE
Πꟻ	585	⅄Π	5	590	0.11	TRUE	FALSE	TRUE
ΠX	580	XΠ	0	580	0.11	FALSE	FALSE	FALSE
ⱭϮ	364	ϮⱭ	206	570	0.1	FALSE	FALSE	FALSE
TP	386	PT	181	567	0.1	TRUE	FALSE	TRUE
ϮC	474	CϮ	88	562	0.1	FALSE	FALSE	FALSE
ⱭO	544	oⱭ	7	551	0.1	FALSE	FALSE	FALSE
ꟻ⅄	305	⅄ꟻ	246	551	0.1	FALSE	FALSE	FALSE
ƋⱭ	447	ⱭƋ	100	547	0.1	FALSE	FALSE	TRUE

ιᗅ	287	ᐞι	260	547	0.1	FALSE	FALSE	FALSE
нп	314	пн	215	529	0.1	FALSE	FALSE	TRUE
ᴈр	477	ρь	52	529	0.1	FALSE	FALSE	TRUE
тѓ	485	ƨт	36	521	0.1	FALSE	FALSE	FALSE
ɴб	360	бɴ	157	517	0.09	FALSE	FALSE	FALSE
сᕁ	494	ᕁс	14	508	0.09	FALSE	FALSE	FALSE
пб	502	бп	0	502	0.09	FALSE	FALSE	FALSE
оϯ	303	ϯо	189	492	0.09	TRUE	FALSE	TRUE
ʏв	412	вʏ	78	490	0.09	FALSE	FALSE	FALSE
ʏᕁ	484	ᕁʏ	0	484	0.09	FALSE	FALSE	FALSE
ƨн	338	нѓ	135	473	0.09	TRUE	FALSE	TRUE
ʏᕀ	397	ᕀʏ	75	472	0.09	FALSE	FALSE	TRUE
ρч	246	чр	214	460	0.08	TRUE	FALSE	TRUE
гє	414	єг	42	456	0.08	FALSE	TRUE	TRUE
чϯ	437	ϯч	1	438	0.08	FALSE	FALSE	FALSE
св	354	вс	72	426	0.08	FALSE	FALSE	TRUE
оо	422	оо	422	422	0.08	FALSE	FALSE	FALSE
ɯϯ	346	ϯɯ	76	422	0.08	FALSE	TRUE	TRUE
пс	341	сп	79	420	0.08	FALSE	FALSE	FALSE
єє	415	єє	415	415	0.08	FALSE	FALSE	FALSE
ƨᕀ	359	ᕀѓ	41	400	0.07	FALSE	FALSE	TRUE
сѓ	262	ƨс	136	398	0.07	FALSE	FALSE	FALSE
ᕁѡ	394	ѡᕁ	3	397	0.07	FALSE	TRUE	TRUE
ѡϯ	293	ϯѡ	94	387	0.07	FALSE	FALSE	FALSE
ʏк	310	кʏ	75	385	0.07	FALSE	TRUE	TRUE
ιᕁ	197	ᕁι	187	384	0.07	FALSE	FALSE	FALSE
ıı	384	ıı	384	384	0.07	FALSE	FALSE	FALSE
ƨв	258	вѓ	120	378	0.07	FALSE	FALSE	FALSE
єᕁ	255	ᕁє	120	375	0.07	FALSE	FALSE	TRUE
чб	360	бч	0	360	0.07	FALSE	TRUE	TRUE
ρɯ	351	ɯр	9	360	0.07	FALSE	FALSE	FALSE
ɴᕁ	276	ᕁɴ	72	348	0.06	FALSE	FALSE	FALSE
ąб	198	бą	146	344	0.06	FALSE	FALSE	TRUE
ск	217	кс	125	342	0.06	FALSE	FALSE	FALSE

үп	311	пү	30	341	0.06	FALSE	FALSE	TRUE
сщ	310	щс	21	331	0.06	FALSE	FALSE	FALSE
гг	307	гг	307	307	0.06	FALSE	FALSE	FALSE
сь	306	эс	1	307	0.06	TRUE	FALSE	TRUE
ıө	257	өı	48	305	0.06	TRUE	FALSE	TRUE
қн	181	нқ	123	304	0.06	FALSE	TRUE	TRUE
нқ	174	қн	129	303	0.06	FALSE	TRUE	TRUE
рн	250	нр	52	302	0.06	FALSE	FALSE	FALSE
щх	301	хщ	0	301	0.06	FALSE	FALSE	TRUE
рқ	177	қр	112	289	0.05	FALSE	FALSE	FALSE
сө	270	өс	10	280	0.05	FALSE	FALSE	FALSE
нв	271	вн	4	275	0.05	FALSE	FALSE	FALSE
үө	207	өү	67	274	0.05	FALSE	TRUE	TRUE
щф	273	фщ	0	273	0.05	FALSE	FALSE	FALSE
ғх	259	хғ	0	259	0.05	FALSE	FALSE	TRUE
тф	257	фт	1	258	0.05	TRUE	FALSE	TRUE
фш	250	шф	6	256	0.05	FALSE	FALSE	TRUE
тқ	190	қт	58	248	0.05	FALSE	FALSE	FALSE
тп	130	пт	117	247	0.05	FALSE	FALSE	FALSE
үб	240	бү	0	240	0.04	FALSE	FALSE	FALSE
ть	214	эт	24	238	0.04	FALSE	FALSE	TRUE
ҷх	237	хч	0	237	0.04	FALSE	FALSE	TRUE
аа	236	аа	236	236	0.04	FALSE	FALSE	FALSE
рс	184	ср	52	236	0.04	FALSE	FALSE	TRUE
аz	162	zа	73	235	0.04	TRUE	FALSE	TRUE
ан	149	на	85	234	0.04	FALSE	FALSE	FALSE
пп	232	пп	232	232	0.04	FALSE	FALSE	FALSE
zı	118	ız	113	231	0.04	FALSE	FALSE	FALSE
хр	141	рх	89	230	0.04	FALSE	FALSE	FALSE
гı	120	ıг	106	226	0.04	FALSE	FALSE	FALSE
қл	207	лқ	18	225	0.04	FALSE	TRUE	TRUE
нт	110	тн	103	213	0.04	FALSE	FALSE	FALSE
ша	147	аш	62	209	0.04	FALSE	TRUE	TRUE
пқ	201	қп	5	206	0.04	FALSE	FALSE	TRUE

ıŧ	141	ɦı	63	204	0.04	FALSE	TRUE	TRUE
пƨ	197	ƧП	6	203	0.04	FALSE	FALSE	TRUE
ɜѡ	164	ѡь	39	203	0.04	TRUE	FALSE	TRUE
ГО	142	ОГ	55	197	0.04	FALSE	FALSE	FALSE
ʎП	121	ПΛ	74	195	0.04	FALSE	TRUE	TRUE
ʏɸ	105	ɸʏ	89	194	0.04	FALSE	FALSE	FALSE
ʏн	191	нʏ	0	191	0.03	TRUE	FALSE	TRUE
ПѪ	112	ѪП	75	187	0.03	FALSE	FALSE	TRUE
ıь	105	ɜı	82	187	0.03	FALSE	FALSE	FALSE
ЧД	173	ДЧ	5	178	0.03	FALSE	FALSE	FALSE
ХО	142	ОХ	33	175	0.03	FALSE	FALSE	FALSE
Гѡ	92	ѡГ	80	172	0.03	FALSE	FALSE	TRUE
ɦП	161	Пŧ	10	171	0.03	FALSE	TRUE	TRUE
ДО	136	ОД	34	170	0.03	FALSE	FALSE	FALSE
вр	105	рв	63	168	0.03	TRUE	FALSE	TRUE
кƨ	139	ƧК	28	167	0.03	FALSE	TRUE	TRUE
Чѳ	162	ѳч	0	162	0.03	FALSE	FALSE	FALSE
ЧК	127	кч	28	155	0.03	FALSE	FALSE	FALSE
рƺ	150	ƺр	0	150	0.03	FALSE	FALSE	FALSE
сс	141	сс	141	141	0.03	FALSE	FALSE	FALSE
нщ	133	щн	8	141	0.03	FALSE	FALSE	TRUE
Дѡ	75	ѡД	64	139	0.03	FALSE	TRUE	TRUE
вт	121	тв	13	134	0.02	TRUE	FALSE	TRUE
ɦв	84	вŧ	50	134	0.02	FALSE	FALSE	FALSE
нг	67	гн	64	131	0.02	FALSE	FALSE	FALSE
ʯʏ	115	ʏʯ	15	130	0.02	FALSE	FALSE	TRUE
кК	130	кК	130	130	0.02	FALSE	FALSE	FALSE
ѳб	98	бѳ	29	127	0.02	TRUE	FALSE	TRUE
гр	72	рг	55	127	0.02	TRUE	FALSE	TRUE
ɦК	89	кŧ	37	126	0.02	FALSE	TRUE	TRUE
Ѫн	80	нХ	46	126	0.02	TRUE	FALSE	TRUE
ɦт	66	тŧ	57	123	0.02	FALSE	FALSE	FALSE
рД	64	Др	55	119	0.02	FALSE	TRUE	TRUE
тХ	106	Ѫт	12	118	0.02	FALSE	FALSE	FALSE

ɦт	105	гŧ	12	117	0.02	FALSE	FALSE	FALSE
нч	65	чн	48	113	0.02	FALSE	FALSE	FALSE
ʒє	83	єʒ	28	111	0.02	FALSE	FALSE	TRUE
чэ	107	эч	1	108	0.02	FALSE	FALSE	TRUE
пч	80	чп	28	108	0.02	FALSE	FALSE	FALSE
ʏь	108	эʏ	0	108	0.02	FALSE	FALSE	FALSE
нх	108	ҳн	0	108	0.02	TRUE	FALSE	TRUE
ʏч	107	чʏ	0	107	0.02	FALSE	FALSE	FALSE
бр	87	рб	19	106	0.02	FALSE	TRUE	TRUE
вв	105	вв	105	105	0.02	FALSE	FALSE	FALSE
тб	104	бт	0	104	0.02	FALSE	TRUE	TRUE
ʌв	76	вʌ	27	103	0.02	FALSE	FALSE	FALSE
щө	101	өщ	1	102	0.02	FALSE	FALSE	TRUE
сʏ	75	ʏс	27	102	0.02	FALSE	FALSE	FALSE
бш	100	шб	0	100	0.02	FALSE	TRUE	TRUE
тт	99	тт	99	99	0.02	FALSE	FALSE	FALSE
ʌг	53	гʌ	45	98	0.02	FALSE	FALSE	FALSE
кщ	93	щк	2	95	0.02	FALSE	FALSE	TRUE
ʏч	69	чʏ	23	92	0.02	FALSE	FALSE	FALSE
ҳƨ	90	ƨҳ	1	91	0.02	TRUE	FALSE	TRUE
чф	89	фч	0	89	0.02	TRUE	FALSE	TRUE
тх	85	хт	0	85	0.02	FALSE	FALSE	TRUE
ҳф	84	фх	0	84	0.02	FALSE	FALSE	FALSE
ąн	72	нą	11	83	0.02	FALSE	FALSE	FALSE
сх	67	хс	16	83	0.02	FALSE	TRUE	TRUE
вщ	60	щв	20	80	0.01	FALSE	FALSE	FALSE
кх	76	ҳк	2	78	0.01	FALSE	TRUE	TRUE
ƨө	76	өг	0	76	0.01	FALSE	TRUE	TRUE
рр	75	рр	75	75	0.01	FALSE	FALSE	FALSE
тө	71	өт	0	71	0.01	FALSE	FALSE	FALSE
ʌʏ	69	ʏʌ	1	70	0.01	FALSE	FALSE	TRUE
ɦр	46	рŧ	23	69	0.01	FALSE	FALSE	FALSE
єн	42	нє	24	66	0.01	FALSE	FALSE	FALSE
єш	57	шє	9	66	0.01	FALSE	TRUE	TRUE

ɴʐ	47	ʐɴ	16	63	0.01	FALSE	FALSE	FALSE
ɋʙ	59	ʙɋ	3	62	0.01	TRUE	FALSE	TRUE
ɸƭ	31	ƭɸ	26	57	0.01	FALSE	FALSE	FALSE
ʏʜ	44	ʜʏ	12	56	0.01	FALSE	FALSE	TRUE
сɸ	56	ɸс	0	56	0.01	FALSE	FALSE	TRUE
сб	44	бс	10	54	0.01	FALSE	TRUE	TRUE
бʏ	32	ʏб	22	54	0.01	FALSE	FALSE	FALSE
бн	50	нб	0	50	0.01	FALSE	FALSE	FALSE
кб	49	бк	0	49	0.01	FALSE	FALSE	FALSE
ʏг	44	гʏ	4	48	0.01	FALSE	FALSE	FALSE
ƭх	45	хƭ	0	45	0.01	FALSE	FALSE	FALSE
ɯʏ	27	ʏɯ	18	45	0.01	FALSE	TRUE	TRUE
ƭƭ	44	ƭƭ	44	44	0.01	FALSE	FALSE	FALSE
гк	41	кг	2	43	0.01	FALSE	FALSE	FALSE
ƭƍ	43	ƍƭ	0	43	0.01	FALSE	FALSE	FALSE
єʒ	34	ʒє	6	40	0.01	FALSE	FALSE	FALSE
хʏ	28	ʏх	11	39	0.01	FALSE	FALSE	FALSE
ɯɯ	38	ɯɯ	38	38	0.01	FALSE	FALSE	FALSE
ʐɷ	37	ɷʐ	0	37	0.01	FALSE	TRUE	TRUE
ɸʏ	28	ʏɸ	9	37	0.01	FALSE	FALSE	FALSE
ɋɋ	34	ɋɋ	34	34	0.01	FALSE	FALSE	FALSE
ƨг	32	гѕ	1	33	0.01	FALSE	FALSE	FALSE
ɑɣ	19	ɣɑ	12	31	0.01	FALSE	FALSE	FALSE
ʏт	18	тʏ	12	30	0.01	FALSE	FALSE	FALSE
пь	29	эп	0	29	0.01	FALSE	FALSE	FALSE
кв	28	вк	0	28	0.01	FALSE	FALSE	FALSE
ɑʒ	18	ʒɑ	9	27	0	FALSE	FALSE	FALSE
ʒı	15	ıʒ	12	27	0	FALSE	FALSE	TRUE
ƭэ	26	эƭ	0	26	0	FALSE	FALSE	FALSE
ɸв	24	вɸ	2	26	0	TRUE	FALSE	TRUE
ƭʏ	25	ʏƭ	0	25	0	TRUE	FALSE	TRUE
ʏх	25	хʏ	0	25	0	FALSE	FALSE	TRUE
ƭб	25	бƭ	0	25	0	FALSE	FALSE	FALSE
хн	15	нх	9	24	0	FALSE	FALSE	FALSE

эн	16	нь	8	24	0	FALSE	FALSE	FALSE
чү	23	үч	0	23	0	FALSE	FALSE	FALSE
иү	14	үи	8	22	0	FALSE	FALSE	TRUE
кх	22	хк	0	22	0	FALSE	FALSE	FALSE
нү	21	үн	0	21	0	FALSE	FALSE	TRUE
аа	20	аа	20	20	0	FALSE	FALSE	FALSE
щб	20	бщ	0	20	0	FALSE	FALSE	FALSE
гн	20	нг	0	20	0	FALSE	FALSE	FALSE
ҙо	20	оҙ	0	20	0	FALSE	TRUE	TRUE
пв	16	вп	2	18	0	FALSE	FALSE	FALSE
нб	17	бн	1	18	0	FALSE	FALSE	FALSE
фө	14	өф	3	17	0	FALSE	FALSE	FALSE
нү	16	үн	0	16	0	FALSE	FALSE	TRUE
тz	16	zт	0	16	0	FALSE	FALSE	FALSE
га	15	аг	0	15	0	FALSE	TRUE	TRUE
хэ	14	эх	0	14	0	FALSE	FALSE	FALSE
кө	13	өк	1	14	0	TRUE	FALSE	TRUE
ль	14	эл	0	14	0	FALSE	FALSE	FALSE
өл	13	лө	0	13	0	FALSE	TRUE	TRUE
пө	12	өп	1	13	0	FALSE	FALSE	TRUE
zо	10	оz	2	12	0	FALSE	FALSE	FALSE
ка	12	ак	0	12	0	FALSE	FALSE	FALSE
кь	11	эк	0	11	0	FALSE	FALSE	FALSE
сz	11	zс	0	11	0	FALSE	FALSE	FALSE
гҙ	11	ҙг	0	11	0	FALSE	FALSE	FALSE
zн	10	нz	1	11	0	FALSE	FALSE	FALSE
тү	9	үт	0	9	0	FALSE	TRUE	TRUE
үе	5	еү	4	9	0	FALSE	FALSE	FALSE
тө	5	өт	3	8	0	FALSE	TRUE	TRUE
са	8	ас	0	8	0	FALSE	FALSE	FALSE
пг	8	гп	0	8	0	FALSE	FALSE	FALSE
са	8	ас	0	8	0	FALSE	TRUE	TRUE
ча	8	ач	0	8	0	FALSE	TRUE	TRUE
лz	7	zл	0	7	0	FALSE	FALSE	FALSE

ГΛ	4	ΛГ	3	7	0	FALSE	FALSE	FALSE
ЧГ	7	Гч	0	7	0	TRUE	FALSE	TRUE
ΚΨ	6	ΨΚ	0	6	0	FALSE	FALSE	TRUE
ΟΨ	6	Ψο	0	6	0	FALSE	TRUE	TRUE
Νξ	4	ξΝ	2	6	0	FALSE	FALSE	TRUE
ΧΒ	5	ΒΧ	0	5	0	FALSE	FALSE	TRUE
ЏЈ	5	ЈЏ	0	5	0	FALSE	FALSE	TRUE
ΠΦ	5	ΦΠ	0	5	0	FALSE	FALSE	FALSE
ωΗ	4	Ηω	1	5	0	FALSE	FALSE	FALSE
Ψω	5	ωΨ	0	5	0	FALSE	FALSE	FALSE
ΗΔ	4	ΔΗ	1	5	0	FALSE	FALSE	FALSE
ΡΨ	5	ΨΡ	0	5	0	FALSE	FALSE	FALSE
ΥΖ	3	ΖΥ	1	4	0	FALSE	FALSE	FALSE
ЏЭ	3	ЭЏ	0	3	0	FALSE	FALSE	FALSE
ΖΗ	3	ΗΖ	0	3	0	FALSE	FALSE	FALSE
СГ	3	ГС	0	3	0	FALSE	FALSE	TRUE
Вь	3	Эв	0	3	0	FALSE	FALSE	TRUE
Ѕэ	3	эЅ	0	3	0	FALSE	FALSE	FALSE
ТГ	3	ГТ	0	3	0	TRUE	FALSE	TRUE
ТΨ	2	ΨТ	0	2	0	FALSE	FALSE	FALSE
ТΔ	2	ΔТ	0	2	0	FALSE	TRUE	TRUE
ЏГ	1	Гщ	1	2	0	FALSE	FALSE	FALSE
ΖΔ	2	ΔΖ	0	2	0	FALSE	FALSE	TRUE
ΒΛ	2	ΛΒ	0	2	0	FALSE	FALSE	FALSE
ГΧ	2	ΧГ	0	2	0	FALSE	FALSE	TRUE
ΛΔ	2	ΔΛ	0	2	0	FALSE	FALSE	FALSE
Кф	2	фК	0	2	0	FALSE	FALSE	FALSE
ВΔ	2	ΔВ	0	2	0	FALSE	TRUE	TRUE
фь	1	Эф	0	1	0	FALSE	FALSE	TRUE
ξК	1	Кξ	0	1	0	FALSE	FALSE	TRUE
ΧΔ	1	ΔΧ	0	1	0	FALSE	FALSE	FALSE
ΧΘ	1	ΘΧ	0	1	0	FALSE	FALSE	FALSE
ΠΔ	1	ΔΠ	0	1	0	FALSE	FALSE	FALSE
РΛ	1	ΛР	0	1	0	FALSE	FALSE	FALSE

ɰʝɅ	1	ʌɷ	0	1	0	FALSE	FALSE	FALSE
ʏʒ	1	ʒʏ	0	1	0	FALSE	FALSE	TRUE
ʙχ	1	ʔʙ	0	1	0	FALSE	FALSE	FALSE
ʏʏ	1	ʏʏ	1	1	0	FALSE	FALSE	FALSE
χʒ	1	ʒχ	0	1	0	FALSE	FALSE	FALSE
SUM					**100**	**7.14**	**19.43**	**51.79**